Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.3.1:
"Reactor Protection System (RPS) Instrumentation"

PART 1:

Indian Point 3
Improved Technical Specifications and Bases

3.3 INSTRUMENTATION

3.3.1 Reactor Protection System (RPS) Instrumentation

LCO 3.3.1 The RPS instrumentation for each Function in Table 3.3.1-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.1-1.

ACTIONS

-------------------------------------NOTE-------------------------------------

Separate Condition entry is allowed for each Function.

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CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more Functions with one or more required channels or trains inoperable.	A.1 Enter the Condition referenced in Table 3.3.1-1 for the channel(s) or train (s).	Immediately
B. One Manual Reactor Trip channel inoperable.	B.1 Restore channel to OPERABLE status.	48 hours
	<u>OR</u>	
	B.2 Be in MODE 3.	54 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One channel or train inoperable.	C.1 Restore channel or train to OPERABLE status.	48 hours
	<u>OR</u>	
	C.2.1 Initiate action to fully insert all rods.	48 hours
	<u>AND</u>	
	C.2.2 Place the Rod Control System in a condition incapable of rod withdrawal.	49 hours
D. One Power Range Neutron Flux - High channel inoperable.	-------------NOTES------------ 1. The inoperable channel may be bypassed for up to 8 hours for surveillance testing and setpoint adjustment of other channels. 2. Requirements of SR 3.2.4.2 are applicable if the Power Range Neutron Flux input to QPTR is inoperable. -------------------------------	
	D.1 Place channel in trip.	6 hours
	<u>OR</u>	
	D.2 Be in MODE 3.	12 hours

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ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. One channel inoperable.	-------------NOTE------------- The inoperable channel may be bypassed for up to 8 hours for surveillance testing of other channels. ------------------------------	
	E.1 Place channel in trip.	6 hours
	<u>OR</u>	
	E.2 Be in MODE 3.	12 hours
F. Required Intermediate Range Neutron Flux channel inoperable.	F.1 Suspend operations involving positive reactivity additions.	Immediately
	<u>AND</u>	
	F.2 Reduce THERMAL POWER to < P-6.	2 hours
G. Required Source Range Neutron Flux channel inoperable.	G.1 Open Reactor Trip Breakers (RTBs).	Immediately

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ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
H. One channel inoperable.	--------------NOTE-------------- The inoperable channel may be bypassed for up to 8 hours for surveillance testing of other channels. -------------------------------	
	H.1 Place channel in trip.	6 hours
	<u>OR</u>	
	H.2 Reduce THERMAL POWER to < P-7.	12 hours
I. One Reactor Coolant Pump Breaker Position channel inoperable.	-------------NOTE-------------- The inoperable channel may be bypassed for up to 8 hours for surveillance testing of other channels. -------------------------------	
	I.1 Restore channel to OPERABLE status.	6 hours
	<u>OR</u>	
	I.2 Reduce THERMAL POWER to < P-8.	10 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
J. One Turbine Trip channel inoperable.	-------------NOTE------------- The inoperable channel may be bypassed for up to 8 hours for surveillance testing of other channels. ------------------------------	
	J.1 Place channel in trip.	6 hours
	OR	
	J.2 Reduce THERMAL POWER to < P-8.	10 hours
K. One train inoperable.	------------NOTE------------- One train may be bypassed for up to 8 hours for surveillance testing provided the other train is OPERABLE. ------------------------------	
	K.1 Restore train to OPERABLE status.	6 hours
	OR	
	K.2 Be in MODE 3.	12 hours

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ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
L. One RTB train inoperable.	-------------NOTES------------ 1. One train may be bypassed for up to 2 hours for surveillance testing, provided the other train is OPERABLE. 2. One RTB may be bypassed for up to 2 hours for maintenance on undervoltage or shunt trip mechanisms, provided the other train is OPERABLE. ------------------------------		
	L.1	Restore train to OPERABLE status.	1 hour
	<u>OR</u>		
	L.2	Be in MODE 3.	7 hours
M. One or more channels inoperable.	M.1	Verify interlock is in required state for existing unit conditions.	1 hour
	<u>OR</u>		
	M.2	Be in MODE 3.	7 hours

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ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
N. One or more channels inoperable.	N.1	Verify interlock is in required state for existing unit conditions.	1 hour
	<u>OR</u>		
	N.2	Be in MODE 2.	7 hours
O. One trip mechanism inoperable for one RTB.	O.1	Restore inoperable trip mechanism to OPERABLE status.	48 hours
	<u>OR</u>		
	O.2.	Be in MODE 3.	54 hours

SURVEILLANCE REQUIREMENTS

-----NOTE-----

Refer to Table 3.3.1-1 to determine which SRs apply for each RPS Function.

	SURVEILLANCE	FREQUENCY
SR 3.3.1.1	Perform CHANNEL CHECK.	12 hours
SR 3.3.1.2	-----NOTES----- 1. Adjust NIS channel if absolute difference is > 2%. 2. Not required to be performed until 24 hours after THERMAL POWER is ≥ 15% RTP. ---------- Compare results of calorimetric heat balance calculation to Nuclear Instrumentation System (NIS) channel output.	24 hours
SR 3.3.1.3	-----NOTES----- 1. Adjust NIS channel if absolute difference is ≥ 3%. 2. Only required to be performed when THERMAL POWER is > 90% RTP. ---------- Compare results of the incore detector measurements to NIS AFD.	31 effective full power days (EFPD)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.1.4	-------------------NOTE------------------- This Surveillance must be performed on the reactor trip bypass breaker prior to placing the bypass breaker in service. -- Perform TADOT.	31 days on a STAGGERED TEST BASIS
SR 3.3.1.5	Perform ACTUATION LOGIC TEST.	31 days on a STAGGERED TEST BASIS
SR 3.3.1.6	-------------------NOTE------------------- Only required to be performed when THERMAL POWER is > 90% RTP. -- Calibrate excore channels to agree with incore detector measurements.	31 EFPD
SR 3.3.1.7	-------------------NOTE------------------- Not required to be performed for source range instrumentation prior to entering MODE 3 from MODE 2 until 4 hours after entry into MODE 3. -- Perform COT.	92 days

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.3.1.8 --------------------NOTE-------------------- This Surveillance shall include verification that interlocks P-6 and P-10 are in their required state for existing unit conditions. -- Perform COT.	------NOTE------ Only required when not performed within previous 92 days --------------- Prior to reactor startup **AND** Four hours after reducing power below P-6 for source range instrumentation **AND** Twelve hours after reducing power below P-10 for power and intermediate instrumentation **AND** Every 92 days thereafter

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SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.3.1.9	------------------NOTE------------------ Verification of setpoint is not required. -- Perform TADOT.	92 days
SR 3.3.1.10	------------------NOTE------------------ This Surveillance shall include verification that the time constants are adjusted to the prescribed values. -- Perform CHANNEL CALIBRATION.	24 months __AND__ 18 months for Function 11
SR 3.3.1.11	------------------NOTE------------------ Neutron detectors are excluded from CHANNEL CALIBRATION. -- Perform CHANNEL CALIBRATION.	24 months

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.3.1.12 ------------------NOTE-------------------- This Surveillance shall include verification that the electronic dynamic compensation time constants are set at the required values. -- Perform CHANNEL CALIBRATION.	24 months
SR 3.3.1.13 Perform COT.	24 months
SR 3.3.1.14 -------------------NOTE-------------------- Verification of setpoint is not required. -- Perform TADOT.	24 months

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Table 3.3.1-1 (page 1 of 8)
Reactor Protection System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Manual Reactor Trip	1,2	2	B	SR 3.3.1.14	NA
	$3^{(a)}$, $4^{(a)}$, $5^{(a)}$	2	C	SR 3.3.1.14	NA
2. Power Range Neutron Flux					
a. High	1,2	$4^{(j)}$	D	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.7 SR 3.3.1.11	≤ 109% RTP
b. Low	$1^{(b)}$,2	$4^{(j)}$	E	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11	≤ 25% RTP
3. Intermediate Range Neutron Flux	$1^{(b)}$,$2^{(c)}$	1	F	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11	NA

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(a) With Rod Control System capable of rod withdrawal or one or more rods not fully inserted.

(b) Below the P-10 (Power Range Neutron Flux) interlocks.

(c) Above the P-6 (Intermediate Range Neutron Flux) interlocks.

(j) Only 3 channels required during Mode 2 Physics Tests, LCO 3.1.8

Table 3.3.1-1 (page 2 of 8)
Reactor Protection System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
4. Source Range Neutron Flux	$2^{(d)}$	1	G	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11	NA
	$3^{(a)}$, $4^{(a)}$, $5^{(a)}$	1	G	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.11	NA
5. Overtemperature ΔT	1,2	4	E	SR 3.3.1.1 SR 3.3.1.3 SR 3.3.1.6 SR 3.3.1.7 SR 3.3.1.12	Refer to Note 1
6. Overpower ΔT	1,2	4	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.12	Refer to Note 2

(continued)

(a) With Rod Control System capable of rod withdrawal or one or more rods not fully inserted.

(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks.

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Table 3.3.1-1 (page 3 of 8)
Reactor Protection System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
7. Pressurizer Pressure					
a. Low	$1^{(e)}$	4	H	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10	≥ 1790 psig
b. High	1,2	3	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10	≤ 2400 psig
8. Pressurizer Water Level - High	$1^{(e)}$	3	H	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10	≤ 97%
9. Reactor Coolant Flow - Low	$1^{(e)}$	3 per loop	H	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10	≥ 90%

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(e) Above the P-7 (Low Power Reactor Trips Block) interlock.

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Table 3.3.1-1 (page 4 of 8)
Reactor Protection System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
10. Reactor Coolant Pump (RCP) Breaker Position					
a. Single Loop	$1^{(f)}$	1 per RCP	I	SR 3.3.1.14	NA
b. Two Loops	$1^{(g)}$	1 per RCP	H	SR 3.3.1.14	NA
11. Undervoltage RCPs (6.9 kV bus)	$1^{(e)}$	1 per bus	H	SR 3.3.1.9 SR 3.3.1.10	NA
12. Underfrequency RCPs (6.9 kV bus)	$1^{(e)}$	1 per bus	H	SR 3.3.1.9 SR 3.3.1.10	$\geq$ 57.22 Hz
13. Steam Generator (SG) Water Level - Low Low	1,2	3 per SG	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10	4.0%
14. SG Water Level - Low	1,2	2 per SG	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10	NA
Coincident with Steam Flow/Feedwater Flow Mismatch	1,2	2 per SG	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10	NA

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(e) Above the P-7 (Low Power Reactor Trips Block) interlock.

(f) Above the P-8 (Power Range Neutron Flux) interlock.

(g) Above the P-7 (Low Power Reactor Trips Block) interlock and below the P-8 (Power Range Neutron Flux) interlock.

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Table 3.3.1-1 (page 5 of 8)
Reactor Protection System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
15. Turbine Trip-Auto-Stop Oil Pressure	1(h)	3	J	SR 3.3.1.10 SR 3.3.1.14	NA
16. Safety Injection (SI) Input from Engineered Safety Feature Actuation System (ESFAS)	1.2	2 trains	K	SR 3.3.1.14	NA
17. Reactor Trip System Interlocks					
a. Intermediate Range Neutron Flux, P-6	2(d)	2 trains	M	SR 3.3.1.11 SR 3.3.1.13	NA
b. Low Power Reactor Trips Block, P-7	1	2 trains	N	SR 3.3.1.11 SR 3.3.1.13	NA
c. Power Range Neutron Flux, P-8	1	4	N	SR 3.3.1.11 SR 3.3.1.13	NA
d. Power Range Neutron Flux, P-10	1.2	4	M	SR 3.3.1.11 SR 3.3.1.13	NA
e. Turbine First Stage Pressure, P-7 Input	1	2	N	SR 3.3.1.1 SR 3.3.1.10 SR 3.3.1.13	NA

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(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks.

(h) Above the P-8 (Power Range Neutron Flux) interlock.

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Table 3.3.1-1 (page 6 of 8)
Reactor Protection System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
18. Reactor Trip Breakers(RTBs)$^{(i)}$	1,2	2 trains	L	SR 3.3.1.4	NA
	$3^{(a)}$, $4^{(a)}$, $5^{(a)}$	2 trains	C	SR 3.3.1.4	NA
19. Reactor Trip Breaker Undervoltage and Shunt Trip Mechanisms	1,2	1 each per RTB	O	SR 3.3.1.4	NA
	$3^{(a)}$, $4^{(a)}$, $5^{(a)}$	1 each per RTB	C	SR 3.3.1.4	NA
20. Automatic Trip Logic	1,2	2 trains	K	SR 3.3.1.5	NA
	$3^{(a)}$, $4^{(a)}$, $5^{(a)}$	2 trains	C	SR 3.3.1.5	NA

(a) With Rod Control System capable of rod withdrawal or one or more rods not fully inserted.

(i) Including any reactor trip bypass breakers that are racked in and closed for bypassing an RTB.

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Table 3.3.1-1 (page 7 of 8)
Reactor Protection System Instrumentation

Note 1: Overtemperature ΔT

The Overtemperature ΔT Function Allowable Value shall not exceed the following:

$$\Delta T \leq \Delta T_o [K_1 - K_2 [(1 + \tau_1 s)/(1 + \tau_2 s)] (T_{avg} - T') + K_3 (P - P') - f(\Delta I)]$$

Where: $K_1 \leq 1.285$ $K_2 = 0.0273$ $K_3 = 0.0013$

$\tau_1 \geq 25$ seconds $\tau_2 \leq 3$ seconds

ΔT_o ≤ Measured full power ΔT for the channel being calibrated, °F.

T_{avg} = Average Temperature for the channel being calibrated, °F (input from instrument racks)

s = Laplace transform operator, seconds^{-1}

T' = Measured full power T_{avg} for the channel being calibrated, °F

P = Pressurizer pressure, psig (input from instrument racks)

P' = 2235 psig (i.e., nominal pressurizer pressure at rated power)

K_1 is a constant which defines the overtemperature ΔT trip margin during steady state operation if the temperature, pressure, and f(ΔI) terms are zero.

K_2 is a constant which defines the dependence of the overtemperature ΔT setpoint to T_{avg}.

K_3 is a constant which defines the dependence of the overtemperature ΔT setpoint to pressurizer pressure.

τ dynamic compensation time constants

ΔI = $q_t - q_b$, where q_t and q_b are the percent power in the top and bottom halves of the core respectively, and $q_t + q_b$ is total core power in percent of RTP.

f(ΔI) = a function of the indicated difference between top and bottom detectors of the power-range nuclear ion chambers; with gains to be selected based on measured instrument response during plant startup tests, where q_t and q_b are defined above such that:

(a) for $q_t - q_b$ between -15.75% and +6.9%,
f(ΔI)=0.

(b) for each percent that the magnitude of $q_t - q_b$ exceeds +6.9%, the ΔT trip setpoint shall be automatically reduced by an equivalent of 3.333% of RTP.

(c) or each percent that the magnitude of $q_t - q_b$ is more negative than -15.75%, the ΔT trip setpoint shall be automatically reduced by an equivalent of 4.000% of RTP.

Table 3.3.1-1 (page 8 of 8)
Reactor Protection System Instrumentation

Note 2: Overpower ΔT

The Overpower ΔT Function Allowable Value shall not exceed the following:

$$\Delta T \leq \Delta T_o (K_4 - K_5 (dTavg/dt) - K_6(T_{avg} - T'))$$

Where:

$K_4 \leq$ 1.154

$K_5 =$ 0 for decreasing average temperature; and
$\geq$ 0.175 sec/°F for increasing average temperature

$K_6 =$ 0 for $T \leq T'$; and
$\geq$ 0.00134 for $T > T'$

$\Delta T_o \leq$ measured full power ΔT for the channel being calibrated, °F

$T_{avg} =$ measured average temperature for the channel being calibrated, °F (input from instrument racks)

$T' =$ measured full power T_{avg} for the channel being calibrated, °F (can be set no higher than 570.3 °F)

s = Laplace transform operator, seconds

K_4 is a constant which defines the overpower ΔT trip margin during steady state operation if the temperature term is zero.

K_5 is a constant determined by dynamic considerations to compensate for piping delays from the core to the loop temperature detectors; it represents the combination of the equipment static gain setting and the time constant setting.

K_6 is a constant which defines the dependence of the overpower ΔT setpoint to T_{avg}.

dTavg/dt is the rate of change of T_{avg}

B 3.3 INSTRUMENTATION

B 3.3.1 Reactor Protection System (RPS) Instrumentation

BASES

BACKGROUND

The RPS initiates a unit shutdown, based on the values of selected unit parameters, to protect against violating the core fuel design limits and Reactor Coolant System (RCS) pressure boundary during anticipated operational occurrences (AOOs) and to assist the Engineered Safety Features (ESF) Systems in mitigating accidents.

The protection and monitoring systems have been designed to assure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RPS, as well as specifying LCOs on other reactor system parameters and equipment performance.

The LSSS, defined in this specification as the Allowable Value, in conjunction with the LCOs, establish the threshold for protective system action to prevent exceeding acceptable limits during Design Basis Accidents (DBAs).

During AOOs, which are those events expected to occur one or more times during the unit life, the acceptable limits are:

1. The Departure from Nucleate Boiling Ratio (DNBR) shall be maintained above the Safety Limit (SL) value to prevent departure from nucleate boiling (DNB);
2. Fuel centerline melt shall not occur; and
3. The RCS pressure SL of 2735 psig shall not be exceeded.

Operation within the SLs of Specification 2.0, "Safety Limits (SLs)," also maintains the above values and assures that offsite dose will be within the 10 CFR 50 and 10 CFR 100 criteria during AOOs.

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BASES

BACKGROUND (continued)

Accidents are events that are analyzed even though they are not expected to occur during the unit life. The acceptable limit during accidents is that offsite dose shall be maintained within an acceptable fraction of 10 CFR 100 limits. Different accident categories are allowed a different fraction of these limits, based on probability of occurrence. Meeting the acceptable dose limit for an accident category is considered having acceptable consequences for that event.

The RPS instrumentation is segmented into four distinct but interconnected modules as described in FSAR, Chapter 7 (Ref. 1), and as identified below:

1. Field transmitters or process sensors: provide a measurable electronic signal based upon the physical characteristics of the parameter being measured;

2. Signal Process Control and Protection System including Analog Protection System, Nuclear Instrumentation System (NIS), field contacts, and protection channels: provides signal conditioning, bistable setpoint comparison, process algorithm actuation, compatible electrical signal output to protection system devices, and control board/control room/ miscellaneous indications;

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3. RPS automatic initiation relay logic, including input, logic, and output: initiates proper unit shutdown in accordance with the defined logic, which is based on the bistable outputs from the signal process control and protection system; and

4. Reactor trip switchgear, including reactor trip breakers (RTBs) and bypass breakers: provides the means to interrupt power to the control rod drive mechanisms (CRDMs) and allows the rod cluster control assemblies (RCCAs), or "rods," to fall into the core and shut down the reactor. The bypass breakers allow testing of the RTBs at power.

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BASES

BACKGROUND (continued)

Field Transmitters or Sensors

To meet the design demands for redundancy and reliability, more than one, and often as many as four, field transmitters or sensors are used to measure unit parameters. To account for the calibration tolerances and instrument drift, which are assumed to occur between calibrations, statistical allowances are provided in the Allowable Values. The OPERABILITY of each transmitter or sensor can be evaluated when its "as found" calibration data are compared against its documented Allowable Value.

Signal Process Control and Protection System

Generally, three or four channels of process control equipment are used for the signal processing of unit parameters measured by the field instruments. The process control equipment provides signal conditioning, comparable output signals for instruments located on the main control board, and comparison of measured input signals with setpoints established to ensure that actuation will occur within the limits assumed in the accident analyses (Ref. 3). If the measured value of a unit parameter exceeds the predetermined setpoint, an output from a bistable is forwarded to the RPS relay logic. Channel separation is maintained up to and through the actuation logic. However, not all unit parameters require four channels of sensor measurement and signal processing. Some unit parameters provide input only to the RPS relay logic, while others provide input to the RPS relay logic, the main control board, the unit computer, and one or more control systems.

Generally, if a parameter is used only for input to the protection circuits, three channels with a two-out-of-three logic are sufficient to provide the required reliability and redundancy. If one channel fails in a direction that would not result in a partial Function trip, the Function is still OPERABLE with a two-out-of-two logic. If one channel fails, such that a partial Function trip occurs, a trip will not occur and the Function is still OPERABLE with a one-out-of-two logic.

Generally, if a parameter is used for input to the RPS relay logic and a control function, four channels with a

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BASES

BACKGROUND (continued)

two-out-of-four logic are sufficient to provide the required reliability and redundancy.The circuit must be able to withstand both an input failure tothe control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. Again, a single failure will neither cause nor prevent the protection function actuation. These requirements are described in IEEE-279-1968 (Ref. 4). The actual number of channels required for each unit parameter is specified in Reference 1 and discussed later in these Technical Specification Bases.

Two logic channels are required to ensure no single random failure of a logic channel will disable the RPS. The logic channels are designed such that testing required while the reactor is at power may be accomplished without causing trip.

Trip Setpoints and Allowable Values

The following describes the relationship between the safety limit, analytical limit, allowable value and channel component calibration acceptance criteria:

a. A Safety Limit (SL) is a limit on the combination of THERMAL POWER, RCS highest loop average temperature, and RCS pressure needed to protect the integrity of physical barriers that guard against the uncontrolled release of radioactivity (i.e., fuel, fuel cladding, RCS pressure boundary and containment). The safety limits are identified in Technical Specification 2.0, Safety Limits (SLs).

b. An Analytical Limit (AL) is the trip actuation point used as an input to the accident analyses presented in FSAR, Chapter 14 (Ref. 3). Analytical limits are developed from event analyses models which consider parameters such as process delays, rod insertion times, reactivity changes, instrument response times, etc. An analytical limit for a trip actuation point is established at a point that will ensure that a Safety Limit (SL) is not exceeded.

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BACKGROUND (continued)

c. An Allowable Value (AV) is the limiting actuation point for the entire channel of a trip function that will ensure, within the required level of confidence, that sufficient allocation exists between this actual trip function actuation point and the analytical limit. The Allowable Value is more conservative than the Analytical Limit to account for instrument uncertainties that either are not present or are not measured during periodic testing. Channel uncertainties that either are not present or are not measured during periodic testing may include design basis accident temperature and radiation effects (Ref. 5) or process dependent effects. The channel allowable value for each RPS function is controlled by Technical Specifications and is listed in Table 3.3.1-1, Reactor Protection System Instrumentation.

d. Calibration acceptance criteria are established by plant administrative programs for the components of a channel (i.e., required sensor, alarm, interlock, display, and trip function). The calibration acceptance criteria are established to ensure, within the required level of confidence, that the Allowable Value for the entire channel will not be exceeded during the calibration interval. | N4,4

A description of the methodology used to calculate the channel allowable values and calibration acceptance criteria is provided in References 6 and 8.

Setpoints in accordance with the Allowable Value ensure that SLs are not violated during AOOs (and that the consequences of DBAs will be acceptable, providing the unit is operated from within the LCOs at the onset of the AOO or DBA and the equipment functions as designed).

Each channel of the relay logic protection system can be tested on line to verify that the signal or setpoint accuracy is within the specified allowance requirements of calculations performed in accordance with Reference 6 that are based on analytical limits consistent with Reference 3. Once a designated channel is taken out of service for testing, a simulated signal is injected in place of the field instrument signal.

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BACKGROUND (continued)

The process equipment for the channel in test is then tested, verified, and calibrated. SRs for the channels are specified in the SRs section.The Allowable Values listed in Table 3.3.1-1 and the Trip Setpoints calculated to ensure that Allowable Values are not exceeded during the calibration interval are based on the methodology described in Reference 6, which incorporates all of the known uncertainties applicable for each channel. All field sensors and signal processing equipment for these channels are assumed to operate within the allowances of these uncertainty magnitudes.

Relay Logic Protection System

Relay logic is used for the decision logic processing of outputs from the signal processing equipment bistables. To meet the redundancy requirements, two trains of relay logic, each performing the same functions, are provided. If one train is taken out of service for maintenance or test purposes, the second train will provide reactor trip and/or ESF actuation for the unit. If both trains are taken out of service or placed in test, a reactor trip will result. Each train is packaged in its own cabinet for physical and electrical separation to satisfy separation and independence requirements. The system has been designed to trip in the event of a loss of power, directing the unit to a safe shutdown condition.

The relay logic performs the decision logic for actuating a reactor trip or ESF actuation, generates the electrical output signal that will initiate the required trip or actuation, and provides the status, permissive, and annunciator output signals to the control room.

The bistable outputs from the signal processing equipment are sensed by the relay logic equipment and combined into logic matrices that represent combinations indicative of various unit upset and accident transients. If a required logic matrix combination is completed, the system will initiate a reactor trip or send actuation signals via master and slave relays to those components whose aggregate Function best serves to alleviate the condition and restore the unit to a safe condition. Examples are given in the Applicable Safety Analyses, LCO, and Applicability sections of this Bases.

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BACKGROUND
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Reactor Trip Breakers

The RTBs are in the electrical power supply line from the control rod drive motor generator set power supply to the CRDMs. Opening of the RTBs interrupts power to the CRDMs, which allows the shutdown rods and control rods to fall into the core by gravity. Each RTB is equipped with a bypass breaker to allow testing of the RTB while the unit is at power. During normal operation the output from the reactor protection system is a voltage signal that energizes the undervoltage coils in the RTBs and bypass breakers, if in use. When the required logic matrix combination is completed, the reactor protection system output voltage signal is removed, the undervoltage coils are de-energized, the breaker trip lever is actuated by the de-energized undervoltage coil, and the RTBs and bypass breakers are tripped open. This allows the shutdown rods and control rods to fall into the core. In addition to the de-energization of the undervoltage coils, each breaker is also equipped with a shunt trip device that is energized to trip the breaker open upon receipt of a reactor trip signal from the reactor protection system. Either the undervoltage coil or the shunt trip mechanism is sufficient by itself, thus providing a diverse trip mechanism.

There are two reactor trip breakers in series so that opening either will interrupt power to the control rod drive mechanisms (CRDMs) and allow the rod cluster control assemblies (RCCAs), or "rods," to fall into the core and shut down the reactor. Each reactor trip breaker has a parallel reactor trip bypass breaker that is normally open. This feature allows testing of the reactor trip breakers at power. A trip signal from RPS logic train A will trip reactor trip breaker A and reactor trip bypass breaker B; and, a trip signal from logic train B will trip reactor trip breaker B and reactor trip bypass breaker A. During normal operation, both reactor trip breakers are closed and both reactor trip bypass breakers are open. An interlock trips both reactor trip bypass breakers if an attempt is made to close a reactor trip bypass breaker when the other reactor trip bypass breaker is already closed.

A trip breaker train consists of both the reactor trip breaker and reactor trip bypass breaker associated with a single RPS logic train if the breaker is racked in, closed, and capable of

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BASES

BACKGROUND (continued)

supplying power to the CRD System. Thus, the train consists of the main breaker; or, the main breaker and bypass breaker associated with this same RPS logic train if both the breaker and bypass are racked in, closed, and capable of supplying power to the CRD System.

The RPS decision logic Functions are described in the functional diagrams included in Reference 2. In addition to the reactor protection and ESFAS trips, the various "permissive interlocks" that are associated with unit conditions are also described.

When any one RPS train is taken out of service for testing, the other train is capable of providing unit monitoring and protection until the testing has been completed.

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

The RPS functions to maintain the Safety Limits (SLs) during all Abnormal Operating Occurences (AOOs) and mitigates the consequences of DBAs in all MODES in which the Rod Control system is capable of rod withdrawal and one or more rods not fully inserted.

Each of the analyzed accidents and transients can be detected by one or more RPS Functions. The accident analysis described in Reference 3 takes credit for most RPS trip Functions. RPS trip Functions not specifically credited in the accident analysis are qualitatively credited in the safety analysis and the NRC staff approved licensing basis. These RPS trip Functions may provide protection for conditions that do not require dynamic transient analysis to demonstrate Function performance. They may also serve as backups to RPS trip Functions that were credited in the accident analysis.

The LCO requires all instrumentation performing an RPS Function, listed in Table 3.3.1-1 in the accompanying LCO, to be OPERABLE. Failure of any instrument renders the affected channel(s) inoperable and reduces the reliability of the affected Functions.

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BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

The LCO generally requires OPERABILITY of four or three channels in each instrumentation Function, two channels of Manual Reactor Trip, and two trains in each Automatic Trip Logic Function. Generally, four OPERABLE instrumentation channels in a two-out-of-four configuration are required when one RPS channel is also used as a control system input. Isolation amplifiers prevent a control system failure from affecting the protection system (Ref. 1). This configuration accounts for the possibility of the shared channel failing in such a manner that it creates a transient that requires RPS action. In this case, the RPS will still provide protection, even with random failure of one of the other three protection channels. Three OPERABLE instrumentation channels in a two-out-of-three configuration are generally required when there is no potential for control system and protection system interaction that could simultaneously create a need for RPS trip and disable one RPS channel. The two-out-of-three and two-out-of-four configurations allow one channel to be tripped during maintenance or testing without causing a reactor trip. Specific exceptions to the above general philosophy exist and are discussed below.

Reactor Protection System Functions

The safety analyses and OPERABILITY requirements applicable to each RPS Function are discussed below:

1. Manual Reactor Trip

The Manual Reactor Trip ensures that the control room operator can initiate a reactor trip at any time by using either of two reactor trip push buttons in the control room. A Manual Reactor Trip accomplishes the same results as any one of the automatic trip Functions. It is used by the reactor operator to shut down the reactor whenever any parameter is rapidly trending toward its Trip Setpoint.

The LCO requires two Manual Reactor Trip channels to be OPERABLE. Each channel is controlled by a manual reactor trip push button. Each channel activates the reactor trip

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

breaker in both trains. Two independent channels are required to be OPERABLE so that no single random failure will disable the Manual Reactor Trip Function.

In MODE 1 or 2, manual initiation of a reactor trip must be OPERABLE. These are the MODES in which the shutdown rods and/or control rods are partially or fully withdrawn from the core. In MODE 3, 4, or 5, the manual initiation Function must also be OPERABLE if one or more shutdown rods or control rods are withdrawn or the Rod Control System is capable of withdrawing the shutdown rods or the control rods. In this condition, inadvertent control rod withdrawal is possible. In MODE 3, 4, or 5, manual initiation of a reactor trip does not have to be OPERABLE if the Rod Control System is not capable of withdrawing the shutdown rods or control rods and if all rods are fully inserted. If the rods cannot be withdrawn from the core, or all of the rods are inserted there is no need to be able to trip the reactor. In MODE 6, neither the shutdown rods nor the control rods are permitted to be withdrawn and the CRDMs are disconnected from the control rods and shutdown rods. Therefore, the manual initiation Function is not required.

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2. <u>Power Range Neutron Flux</u>

The NIS power range detectors are located external to the reactor vessel and measure neutrons leaking from the core. The NIS power range detectors provide input to the Rod Control System and Turbine Control System. Four channels of NIS are required because the actuation logic must be able to withstand an input failure to the control system which may then require the protection function actuation and a single failure in the other three channels providing the protection function actuation. Note that this Function also provides a signal to prevent automatic and manual rod withdrawal prior to initiating a reactor trip. Limiting

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(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

further rod withdrawal may terminate the transient and eliminate the need to trip the reactor.

a. <u>Power Range Neutron Flux-High</u>

The Power Range Neutron Flux-High trip Function ensures that protection is provided, from all power levels, against a positive reactivity excursion leading to DNB during power operations. These can be caused by rod withdrawal or reductions in RCS temperature.

The LCO requires all four of the Power Range Neutron Flux-High channels to be OPERABLE. These channels are considered OPERABLE during required Surveillance tests that require insertion of a test signal if the channel remains untripped and capable of tripping due to an increasing neutron flux signal. During MODE 2 Physics Tests, only 3 channels are required because the output from one detector is used for test instrumentation.

In MODE 1 or 2, when a positive reactivity excursion could occur, the Power Range Neutron Flux-High trip must be OPERABLE. This Function will terminate the reactivity excursion and shut down the reactor prior to reaching a power level that could damage the fuel. In MODE 3, 4, 5, or 6, the NIS power range detectors cannot detect neutron levels in this range. In these MODES, the Power Range Neutron Flux-High does not have to be OPERABLE because the reactor is shut down and reactivity excursions into the power range are extremely unlikely. Other RPS Functions and administrative controls provide protection against reactivity additions when in MODE 3, 4, 5, or 6.

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APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

The Power Range Neutron Flux-High Allowable Value and Trip Setpoint are in accordance with Consolidated Edison Company of New York, Inc. Indian Point Nuclear Generating Station Unit No. 3 Plant Manual Volume VI: Precautions, Limitations, and Setpoints, March 1975 (Ref. 8).

b. <u>Power Range Neutron Flux-Low</u>

The LCO requirement for the Power Range Neutron Flux - Low trip Function ensures that protection is provided against a positive reactivity excursion from low power or subcritical conditions.

The LCO requires all four of the Power Range Neutron Flux - Low channels to be OPERABLE. During MODE 2 Physics Tests, only 3 channels are required because the output from one detector is used for test instrumentation.

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In MODE 1, below the Power Range Neutron Flux (P-10 setpoint), and in MODE 2, the Power Range Neutron Flux - Low trip must be OPERABLE. This Function may be manually blocked by the operator when two out of four power range channels are greater than approximately 10% RTP (P-10 setpoint). This Function is automatically unblocked when three out of four power range channels are below the P-10 setpoint. Above the P-10 setpoint, positive reactivity additions are mitigated by the Power Range Neutron Flux - High trip Function.

In MODE 3, 4, 5, or 6, the Power Range Neutron Flux - Low trip Function does not have to be OPERABLE because the reactor is shut down and the NIS power range detectors cannot detect neutron levels in this

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

range. Other RPS trip Functions and administrative controls provide protection against positive reactivity additions or power excursions in MODE 3, 4, 5, or 6.

The Power Range Neutron Flux-Low Allowable Value and Trip Setpoint are in accordance with Consolidated Edison Company of New York, Inc. Indian Point Nuclear Generating Station Unit No. 3 Plant Manual Volume VI: Precautions, Limitations, and Setpoints, March 1975 (Ref. 8).

3. Intermediate Range Neutron Flux

The Intermediate Range Neutron Flux trip Function ensures that protection is provided against an uncontrolled RCCA bank rod withdrawal accident from a subcritical condition during startup. This trip Function provides redundant protection to the Power Range Neutron Flux – Low Setpoint trip Function. Therefore, only one of the two channels of Intermediate Range Neutron Flux is Required to be OPERABLE in the Applicable MODES. Either of the two channels can be used to satisfy this requirement. The NIS intermediate range detectors are located external to the reactor vessel and measure neutrons leaking from the core. The NIS intermediate range detectors do not provide any input to control systems. Note that this Function also provides a signal to prevent automatic and manual rod withdrawal prior to initiating a reactor trip. Limiting further rod withdrawal may terminate the transient and eliminate the need to trip the reactor.

The LCO requires one channel of Intermediate Range Neutron Flux to be OPERABLE. One OPERABLE channel is sufficient to provide redundant protection to the Power Range Neutron Flux – Low Setpoint trip Function.

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BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

Table 3.3.1-1 identifies the Technical Specification Allowable Value for this trip function as not applicable (NA) because LCO 3.3.1, Function 2.b, Power Range Neutron Flux-Low, is used to bound the analysis for an uncontrolled control rod assembly withdrawal from a subcritical condition. The surveillance acceptance criterion used for this function is 25% RTP. This value was established based on Indian Point Nuclear Generating Station Unit No. 3 Plant Manual Volume VI: Precautions, Limitations, and Setpoints, March 1975, (Ref. 8).

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Because this trip Function is important only during startup, there is generally no need to disable channels for testing while the Function is required to be OPERABLE. Therefore, a third channel is unnecessary.

The Intermediate Range Neutron Flux trip must be OPERABLE in MODE 1 below the P-10 setpoint, and in MODE 2 above the P-6 setpoint, when there is a potential for an uncontrolled RCCA bank rod withdrawal accident during reactor startup. Above the P-10 setpoint, the Power Range Neutron Flux – High Setpoint trip provides core protection for a rod withdrawal accident. In MODE 2, below the P-6 setpoint, the source Range Neutron Flux Trip provides backup core protection for reactivity accidents. In MODE 3, 4, or 5, the Intermediate Range Neutron Flux trip does not have to be OPERABLE because the control rods must be fully inserted and only the shutdown rods may be withdrawn. The reactor cannot be started up in this condition. The core also has the required SDM to mitigate the consequences of a positive reactivity addition accident. In MODE 6, all rods are fully inserted and the core has a required increased SDM. Also, the NIS intermediate range detectors cannot detect neutron levels present in this MODE.

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APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

4. <u>Source Range Neutron Flux</u>

The LCO requirement for the Source Range Neutron Flux trip Function ensures that protection is provided against an uncontrolled RCCA bank rod withdrawal accident from a subcritical condition during startup. This trip Function provides redundant protection to the Power Range Neutron Flux - Low trip Function. Therefore, only one of the two channels of Source Range Neutron Flux is Required to be OPERABLE in the Applicable MODES. Either of the two channels can be used to satisfy this requirement. In MODES 3, 4, and 5, administrative controls also prevent the uncontrolled withdrawal of rods. The NIS source range detectors are located external to the reactor vessel and measure neutrons leaking from the core. The NIS source range detectors do not provide any inputs to control systems. The source range trip is the only RPS automatic protection function required in MODES 3, 4, and 5 when rods are capable of withdrawal or one or more rods are not fully inserted.

The LCO requires one channel of Source Range Neutron Flux to be OPERABLE. One OPERABLE channel is sufficient to provide redundant protection to the Power Range Neutron Flux - Low Setpoint trip Function.

NYPA

Table 3.3.1-1 identifies the Technical Specification Allowable Value for this trip function as not applicable (NA) because LCO 3.3.1, Function 2.b, Power Range Neutron Flux-Low, is used to bound the analysis for an uncontrolled control rod assembly withdrawal from a subcritical condition. The surveillance acceptance criterion used for this function is 5.0 E+5 counts per second.

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APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

The Source Range Neutron Flux Function provides protection for control rod withdrawal from subcritical. The Function also provides visual neutron flux indication in the control room.

In MODE 2 when below the P-6 setpoint and in MODES 3, 4, and 5, when there is a potential for an uncontrolled RCCA bank withdrawal accident, the Source Range Neutron Flux trip must be OPERABLE. Above the P-6 setpoint, the Intermediate Range Neutron Flux trip and the Power Range Neutron Flux – Low trip will provide core protection for reactivity accidents. Above the P-6 setpoint, the NIS source range detectors are de-energized.

In MODEs 3, 4, and 5 with all rods fully inserted and the Rod Control System not capable of rod withdrawal, and in MODE 6, the outputs of this function to the RPS logic are not required to be OPERABLE. The requirements for the NIS source range detectors in MODE 6 are addressed in LCO 3.9.2, "Nuclear Instrumentation."

5. Overtemperature ΔT

The Overtemperature ΔT trip Function is provided to ensure that the design limit DNBR is met. This trip Function also limits the range over which the Overpower ΔT trip Function must provide protection. The inputs to the Overtemperature ΔT trip include pressure, coolant temperature, axial power distribution, and reactor power as indicated by loop ΔT assuming full reactor coolant flow. Protection from violating the DNBR limit is assured for those transients that are slow with respect to delays from the core to the measurement system. The Overtemperature ΔT trip Function uses each loop's ΔT as a measure of reactor power and is compared with a setpoint that is automatically varied with the following parameters:

- reactor coolant average temperature – the Trip Setpoint is varied to correct for changes in coolant density and specific heat capacity with changes in coolant temperature;

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APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

- pressurizer pressure – the Trip Setpoint is varied to correct for changes in system pressure; and
- axial power distribution – f(ΔI), the Trip Setpoint is varied to account for imbalances in the axial power distribution as detected by the NIS upper and lower power range detectors. If axial peaks are greater than the Technical Specification limit, as indicated by the difference between the upper and lower NIS power range detectors, the Trip Setpoint is reduced in accordance with Note 1 of Table 3.3.1-1.

Dynamic compensation is included for system piping delays from the core to the temperature measurement system.

The Overtemperature ΔT trip Function is calculated for each loop as described in Note 1 of Table 3.3.1-1. Trip occurs if Overtemperature ΔT is indicated in two loops. The

pressure and temperature signals are used for other control functions. Therefore, the actuation logic is designed to withstand an input failure to the control system, which may

then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. Note that this Function also provides a signal to generate a turbine runback prior to reaching the Trip Setpoint. A turbine runback will reduce turbine power and reactor power. A reduction in power will normally alleviate the Overtemperature ΔT condition and may prevent a reactor trip.

The LCO requires all four channels of the Overtemperature ΔT trip Function to be OPERABLE. Note that the Overtemperature ΔT Function receives input from channels shared with other RPS Functions. Failures that affect multiple Functions require entry into the Conditions applicable to all affected Functions.

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APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

In MODE 1 or 2, the Overtemperature ΔT trip must be OPERABLE to prevent DNB. In MODE 3, 4, 5, or 6, this trip Function does not have to be OPERABLE because the reactor is not operating and there is insufficient heat production to be concerned about DNB.

6. Overpower ΔT

The Overpower ΔT trip Function ensures that protection is provided to ensure the integrity of the fuel (i.e., no fuel pellet melting and less than 1% cladding strain) under all possible overpower conditions. This trip Function also limits the required range of the Overtemperature ΔT trip Function and provides a backup to the Power Range Neutron Flux - High Setpoint trip. The Overpower ΔT trip Function ensures that the allowable heat generation rate (kW/ft) of the fuel is not exceeded. It uses the ΔT of each loop as a measure of reactor power with a setpoint that is automatically varied with the following parameters:

- reactor coolant average temperature - the Trip Setpoint is varied to correct for changes in coolant density and specific heat capacity with changes in coolant temperature; and
- rate of change of reactor coolant average temperature - including a constant determined by dynamic considerations that provides compensation for the delays between the core and the temperature measurement system.

The Overpower ΔT trip Function is calculated for each loop as per Note 2 of Table 3.3.1-1. Trip occurs if Overpower ΔT is indicated in two loops. The temperature signals are used for other control functions. Therefore, the actuation logic is designed to withstand an input failure to the control system, which may then require the protection function actuation and a single failure in the remaining channels providing the protection function actuation.

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APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

Note that this Function also provides a signal to generate a turbine runback prior to reaching the Allowable Value. A turbine runback will reduce turbine power and reactor power. A reduction in power will normally alleviate the Overpower ΔT condition and may prevent a reactor trip.

The LCO requires four channels of the Overpower ΔT trip Function to be OPERABLE. Note that the Overpower ΔT trip Function receives input from channels shared with other RPS Functions. Failures that affect multiple Functions require entry into the Conditions applicable to all affected Functions.

In MODE 1 or 2, the Overpower ΔT trip Function must be OPERABLE. These are the only times that enough heat is generated in the fuel to be concerned about the heat generation rates and overheating of the fuel. In MODE 3, 4, 5, or 6, this trip Function does not have to be OPERABLE because the reactor is not operating and there is insufficient heat production to be concerned about fuel overheating and fuel damage.

7. Pressurizer Pressure

The same sensors provide input to the Pressurizer Pressure - High and - Low trips and the Overtemperature ΔT trip. The Pressurizer Pressure channels are also used to provide input to the Pressurizer Pressure Control System. Therefore, the actuation logic is designed to withstand an input failure to the control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. Note that the plant design and this LCO require 4 channels for the Pressurizer Pressure—Low trips but requires only 3 channels of Pressurizer Pressure - High. This difference recognizes the role of pressurizer code safety valves in response to a high pressure condition.

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APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

a. Pressurizer Pressure-Low

The Pressurizer Pressure - Low trip Function ensures that protection is provided against violating the DNBR limit due to low pressure.

The LCO requires four channels of Pressurizer Pressure - Low to be OPERABLE.

In MODE 1, when DNB is a major concern, the Pressurizer Pressure - Low trip must be OPERABLE. This trip Function is automatically enabled on increasing power by the P-7 interlock (NIS power range P-10 or turbine first stage pressure greater than approximately 10% of full power equivalent). On decreasing power, this trip Function is automatically blocked below P-7. Below the P-7 setpoint, no conceivable power distributions can occur that would cause DNB concerns.

b. Pressurizer Pressure-High

The Pressurizer Pressure - High trip Function ensures that protection is provided against overpressurizing the RCS. This trip Function operates in conjunction with the pressurizer relief and safety valves to prevent RCS overpressure conditions.

The LCO requires three channels of the Pressurizer Pressure - High to be OPERABLE.

The Pressurizer Pressure - High Allowable Value is selected to be below the pressurizer safety valve actuation pressure and above the power operated relief valve (PORV) setting. This setting minimizes challenges to safety valves while avoiding unnecessary reactor trip for those pressure increases that can be controlled by the PORVs.

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BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

In MODE 1 or 2, the Pressurizer Pressure - High trip must be OPERABLE to help prevent RCS overpressurization and minimize challenges to the safety valves. In MODE 3, 4, 5, or 6, the Pressurizer Pressure - High trip Function does not have to be OPERABLE because transients that could cause an overpressure condition will be slow to occur. Therefore, the operator will have sufficient time to evaluate unit conditions and take corrective actions. Additionally, low temperature overpressure protection systems provide overpressure protection when RCS temperature is less than the LTOP arming temperature specified in LCO 3.4.12, Low Temperature Overpressure Protection (LTOP).

8. <u>Pressurizer Water Level-High</u>

The Pressurizer Water Level - High trip Function provides a backup signal for the Pressurizer Pressure - High trip and also provides protection against water relief through the pressurizer safety valves. These valves are designed to pass steam in order to achieve their design energy removal rate. A reactor trip is actuated prior to the pressurizer becoming water solid. The LCO requires three channels of Pressurizer Water Level - High to be OPERABLE. The pressurizer level channels are used as input to the Pressurizer Level Control System. A fourth channel is not required to address control/protection interaction concerns because the level channels do not actuate the safety valves, and the high pressure reactor trip is set below the safety valve setting. Therefore, with the slow rate of charging available, pressure overshoot due to level channel failure cannot cause the safety valve to lift before reactor high pressure trip.

In MODE 1, when there is a potential for overfilling the pressurizer, the Pressurizer Water Level - High trip must be OPERABLE. This trip Function is automatically enabled on increasing power by the P-7 interlock.

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APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

On decreasing power, this trip Function is automatically blocked below P-7. Below the P-7 setpoint, transients that could raise the pressurizer water level will be slow and the operator will have sufficient time to evaluate unit conditions and take corrective actions.

9. Reactor Coolant Flow-Low

a. Reactor Coolant Flow-Low (Single Loop)

The Reactor Coolant Flow - Low (Single Loop) trip Function ensures that protection is provided against violating the DNBR limit due to low flow in one or more RCS loops, while avoiding reactor trips due to normal variations in loop flow. Above the P-8 setpoint, which is approximately 50% RTP, a loss of flow in any RCS loop will actuate a reactor trip. Each RCS loop has three flow detectors to monitor flow. The flow signals are not used for any control system input.

The LCO requires three Reactor Coolant Flow - Low channels per RCS loop to be OPERABLE in MODE 1 above P-8. Each reactor coolant loop is considered to be a separate function. Therefore, separate condition entry is allowed for each loop.

In MODE 1 above the P-8 setpoint, a loss of flow in one RCS loop could result in DNB conditions in the core. In MODE 1 below the P-8 setpoint, a loss of flow in two or more loops is required to actuate a reactor trip (Function 9.b) because of the lower power level and the greater margin to the design limit DNBR.

b. Reactor Coolant Flow-Low (Two Loops)

The Reactor Coolant Flow - Low (Two Loops) trip Function ensures that protection is provided against

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BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

violating the DNBR limit due to low flow in two or more RCS loops while avoiding reactor trips due to normal variations in loop flow.

Above the P-7 setpoint and below the P-8 setpoint, a loss of flow in two or more loops will initiate a reactor trip. Each loop has three flow detectors to monitor flow. The flow signals are not used for any control system input.

The LCO requires three Reactor Coolant Flow - Low channels per loop to be OPERABLE. Each reactor coolant loop is considered to be a separate function. Therefore, separate condition entry is allowed for each loop.

In MODE 1 above the P-7 setpoint and below the P-8 setpoint, the Reactor Coolant Flow - Low (Two Loops) trip must be OPERABLE. Below the P-7 setpoint, all reactor trips on low flow are automatically blocked since no conceivable power distributions could occur that would cause a DNB concern at this low power level. Above the P-7 setpoint, the reactor trip on low flow in two or more RCS loops is automatically enabled. Above the P-8 setpoint, a loss of flow in any one loop (Function 9.a) will actuate a reactor trip because of the higher power level and the reduced margin to the design limit DNBR.

10. <u>Reactor Coolant Pump (RCP) Breaker Position</u>

Both RCP Breaker Position trip Functions operate to anticipate the Reactor Coolant Flow - Low trips to avoid RCS heatup that would occur before the low flow trip actuates.

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APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

a. Reactor Coolant Pump Breaker Position (Single Loop)

The RCP Breaker Position (Single Loop) trip Function ensures that protection is provided against violating the DNBR limit due to a loss of flow in one RCS loop. The position of each RCP breaker is monitored. If one RCP breaker is open above the P-8 setpoint, a reactor trip is initiated. This trip Function will generate a reactor trip before the Reactor Coolant Flow - Low (Single Loop) Trip Setpoint is reached.

The LCO requires one RCP Breaker Position channel per RCP to be OPERABLE. One OPERABLE channel is sufficient for this trip Function because the RCS Flow - Low trip alone provides sufficient protection of unit SLs for loss of flow events. The RCP Breaker Position trip serves only to anticipate the low flow trip, minimizing the thermal transient associated with loss of a pump. Each reactor coolant loop is considered to be a separate function. Therefore, separate condition entry is allowed for each loop.

This Function measures only the discrete position (open or closed) of the RCP breaker, using a position switch. Therefore, the Function has no adjustable trip setpoint with which to associate an LSSS.

In MODE 1 above the P-8 setpoint, when a loss of flow in any RCS loop could result in DNB conditions in the core, the RCP Breaker Position (Single Loop) trip must be OPERABLE. In MODE 1 below the P-8 setpoint, a loss of flow in two or more loops (Function 10.b) is required to actuate a reactor trip because of the lower power level and the greater margin to the design limit DNBR.

b. Reactor Coolant Pump Breaker Position (Two Loops)

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APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

The RCP Breaker Position (Two Loops) trip Function ensures that protection is provided against violating the DNBR limit due to a loss of flow in two or more RCS loops. The position of each RCP breaker is monitored. Above the P-7 setpoint a loss of flow in two or more loops will initiate a reactor trip. This trip Function will generate a reactor trip before the Reactor Coolant Flow - Low (Two Loops) Trip Setpoint is reached.

The LCO requires one RCP Breaker Position channel per RCP to be OPERABLE. One OPERABLE channel is sufficient for this Function because the RCS Flow - Low trip alone provides sufficient protection of unit SLs for loss of flow events. The RCP Breaker Position trip serves only to anticipate the low flow trip, minimizing the thermal transient associated with loss of an RCP. Each reactor coolant loop is considered to be a separate function. Therefore, separate condition entry is allowed for each loop.

This Function measures only the discrete position (open or closed) of the RCP breaker, using a position switch. Therefore, the Function has no adjustable trip setpoint with which to associate an LSSS.

In MODE 1 above the P-7 setpoint and below the P-8 setpoint, the RCP Breaker Position (Two Loops) trip must be OPERABLE. Below the P-7 setpoint, all reactor trips on loss of flow are automatically blocked since no conceivable power distributions could occur that would cause a DNB concern at this low power level. Above the P-7 setpoint, the reactor trip on loss of flow in two RCS loops is automatically enabled. Above the P-8 setpoint, a loss of flow in any one loop (Function 10.a) will actuate a reactor trip because of the higher power level and the reduced margin to the design limit DNBR.

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APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

11. Undervoltage Reactor Coolant Pumps (6.9 kV Bus)

The Undervoltage RCPs direct reactor trip Function ensures that protection is provided against violating the DNBR limit due to a loss of flow in two or more RCS loops. The voltage to each 6.9 kV bus used to power an RCP is monitored. Above the P-7 setpoint, a loss of voltage detected on two or more RCP buses will initiate a direct reactor trip. This trip Function will generate a reactor trip before the Reactor Coolant Flow-Low (Two Loops) Trip Setpoint is reached. Time delays are incorporated into the Undervoltage RCPs channels associated with the direct reactor trip and are provided to prevent reactor trips due to momentary electrical power transients.

The LCO requires one Undervoltage RCPs channel per bus to be OPERABLE. The Allowable Value for this trip function is shown as NA because there is no Analytical Limit for RCP Undervoltage. The RCPs will continue to operate and deliver required RCS flow during an Undervoltage Condition. The reactor trip on RCP Undervoltage is a time-zero initiating event assumed in the safety analysis (Reference 3). The UV relay is adjusted for a nominal trip setpoint of 75% of the 6900 Vac bus voltage and the surveillance acceptance criterion used for this function is ≥70%.

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In MODE 1 above the P-7 setpoint, the Undervoltage RCP trip must be OPERABLE. Below the P-7 setpoint, all reactor trips on loss of flow are automatically blocked since no conceivable power distributions could occur that would cause a DNB concern at this low power level. Above the P-7 setpoint, the reactor trip on loss of flow in two or more RCS loops is automatically enabled.

12. Underfrequency Reactor Coolant Pumps

The Underfrequency RCPs reactor trip Function ensures that protection is provided against violating the DNBR limit due to

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

a loss of flow in two or more RCS loops from a major network frequency disturbance. An underfrequency condition will slow down the pumps, thereby reducing their coastdown time following a pump trip. The proper coastdown time is required so that reactor heat can be removed immediately after reactor trip. The frequency of each RCP bus is monitored. A loss of frequency detected on two or more RCP buses trips all four RCPs, a condition that will initiate a reactor trip. This trip Function will generate a reactor trip before the Reactor Coolant Flow - Low (Two Loops) Trip Setpoint is reached.

The LCO requires one Underfrequency RCP channel per bus to be OPERABLE.

In Mode 1 above the P-7 Setpoint, the Underfrequency RCP's trip must be OPERABLE. Below the P-7 Setpoint, all reactor trips on loss off flow are automatically blocked since no conceivable power distribution could occur that would cause a DNB Concern at this low power level. Above the P-7 Setpoint, the reactor trip on loss of flow in two or more RCS loops is automatically enabled. RAI-17

13. Steam Generator Water Level - Low Low

The SG Water Level - Low Low trip Function ensures that protection is provided against a loss of heat sink and actuates the AFW System prior to uncovering the SG tubes. The SGs are the heat sink for the reactor. In order to act as a heat sink, the SGs must contain a minimum amount of water. A narrow range low low level in any SG is indicative of a loss of heat sink for the reactor. The "B" channel level transmitters provide input to the SG Level Control System. Therefore, the actuation logic must be able to withstand an input failure to the control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. This Function also performs the ESFAS function of starting the AFW pumps on low low SG level. RAI-17

(continued)

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

The LCO requires three channels of SG Water Level – Low Low per SG to be OPERABLE. Each SG is considered to be a separate function. Therefore, separate condition entry is allowed for each SG.

In MODE 1 or 2, when the reactor requires a heat sink, the SG Water Level – Low Low trip must be OPERABLE. The normal source of water for the SGs is the Main Feedwater (MFW) System (not safety related). The MFW System is only in operation in MODE 1 or 2. The AFW System is the safety related backup source of water to ensure that the SGs remain the heat sink for the reactor. During normal startups and shutdowns, the AFW System provides feedwater to maintain SG level. In MODE 3, 4, 5, or 6, the SG Water Level – Low Low Function does not have to be OPERABLE because the MFW System is not in operation and the reactor is not critical. Decay heat removal is accomplished by the AFW System in MODE 3 and 4 and by the Residual Heat Removal (RHR) System in MODE 4, 5, or 6.

14. <u>Steam Generator Water Level-Low, Coincident With Steam Flow/Feedwater Flow Mismatch</u>

SG Water Level – Low, in conjunction with the Steam Flow/Feedwater Flow Mismatch, ensures that protection is provided against a loss of heat sink and actuates the AFW System. In addition to a decreasing water level in the SG, the difference between feedwater flow and steam flow is evaluated to determine if feedwater flow is significantly less than steam flow. With less feedwater flow than steam flow, SG level will decrease at a rate dependent upon the magnitude of the difference in flow rates. The required logic is developed from two SG level channels and two Steam Flow/Feedwater Flow Mismatch channels per SG. One narrow range level channel coincident with the associated Steam Flow/Feedwater Flow Mismatch channel for the same SG (steam flow greater than feed flow) will actuate a reactor trip.

The LCO requires two channels of SG Water Level – Low coincident with Steam Flow/Feedwater Flow Mismatch. RPi-1

(continued)

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

Each SG is considered to be a separate function. Therefore, separate condition entry is allowed for each SG.

Table 3.3.1-1 identifies the Technical Specification Allowable Value for this trip function as not applicable (NA) because LCO 3.3.1, Function 13, Steam Generator Water Level-Low Low, is used to bound the analysis for a loss of feedwater event. The allowable values required for OPERABILITY of Function 13 is ≥ 4.0%. The surveillance acceptance criteria used for Function 14 are ≥7.5% narrow range level and ≤3.3E+5 pounds per hour steam flow/feedwater flow mismatch.

N/PA

In MODE 1 or 2, when the reactor requires a heat sink, the SG Water Level - Low coincident with Steam Flow/Feedwater Flow Mismatch trip must be OPERABLE. The normal source of water for the SGs is the MFW System (not safety related). The MFW System is only in operation in MODE 1 or 2. The AFW System is the safety related backup source of water to ensure that the SGs remain the heat sink for the reactor. During normal startups and shutdowns, the AFW System provides feedwater to maintain SG level. In MODE 3, 4, 5, or 6, the SG Water Level - Low coincident with Steam Flow/Feedwater Flow Mismatch Function does not have to be OPERABLE because the MFW System is not in operation and the reactor is not critical. Decay heat removal is accomplished by the AFW System in MODE 3 and 4 and by the RHR System in MODE 4, 5, or 6. The MFW System is in operation only in MODE 1 or 2 and, therefore, this trip Function need only be OPERABLE in these MODES.

15. <u>Turbine Trip - Low Auto-Stop Oil Pressure</u>

The Turbine Trip - Low Auto-Stop Oil Pressure trip Function anticipates the loss of heat removal capabilities of the secondary system following a turbine trip. This trip Function acts to minimize the pressure/temperature transient on the reactor. Any turbine trip from a power

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

level below the P-8 setpoint, approximately 50% power, will not actuate a reactor trip. Three pressure switches monitor the control oil pressure in the Turbine Control System. A low pressure condition sensed by two-out-of-three pressure switches will actuate a reactor trip. These pressure switches do not provide any input to the control system. The unit is designed to withstand a complete loss of load and not sustain core damage or challenge the RCS pressure limitations. Core protection is provided by the Pressurizer Pressure - High trip Function and RCS integrity is ensured by the pressurizer safety valves. Amend 192

The LCO requires three channels of Turbine Trip - Low Auto-Stop Oil Pressure to be OPERABLE in MODE 1 above P-8. Amend 192

Below the P-8 setpoint, a turbine trip does not actuate a reactor trip. In MODE 1 (below P-8 setpoint), 2, 3, 4, 5, or 6, there is no potential for a turbine trip that would require a reactor trip, and the Turbine Trip - Low Auto-Stop Oil Pressure trip Function does not need to be OPERABLE. Amend 192

16. Safety Injection Input from Engineered Safety Feature Actuation System

The SI Input from ESFAS ensures that if a reactor trip has not already been generated by the RPS, the ESFAS automatic actuation logic will initiate a reactor trip signal upon any signal that initiates SI. This is a condition of acceptability for the LOCA. However, other transients and accidents take credit for varying levels of ESF performance and rely upon rod insertion, except for the most reactive rod that is assumed to be fully withdrawn, to ensure reactor shutdown. Therefore, a reactor trip is initiated every time an SI signal is present.

Trip Setpoint and Allowable Values are not applicable to this Function. The SI Input is provided by relay in the ESFAS. Therefore, there is no measurement signal with which to associate an LSSS.

(continued)

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

The LCO requires two trains of SI Input from ESFAS to be OPERABLE in MODE 1 or 2.

A reactor trip is initiated every time an SI signal is present. Therefore, this trip Function must be OPERABLE in MODE 1 or 2, when the reactor is critical, and must be shut down in the event of an accident. In MODE 3, 4, 5, or 6, the reactor is not critical, and this trip Function does not need to be OPERABLE.

17. Reactor Trip System Interlocks

Reactor protection interlocks are provided to ensure reactor trips are in the correct configuration for the current unit status. They back up operator actions to ensure protection system Functions are not bypassed during unit conditions under which the safety analysis assumes the Functions are not bypassed. Therefore, the interlock Functions do not need to be OPERABLE when the associated reactor trip functions are outside the applicable MODES. These are:

a. Intermediate Range Neutron Flux, P-6

The Intermediate Range Neutron Flux, P-6 interlock is actuated when any NIS intermediate range channel goes approximately one decade above the minimum channel reading. If both channels drop below the setpoint, the permissive will automatically be defeated. Manual defeat of the P-6 interlock can be accomplished at any time by simultaneous actuation of both Reset pushbuttons. The LCO requirement for the P-6 interlock ensures that the following Functions are performed:

- on increasing power, the P-6 interlock allows the manual block of the NIS Source Range, Neutron Flux reactor trip. This prevents a premature block of the source range trip and allows the operator to ensure that the

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

intermediate range is OPERABLE prior to leaving the source range. The source range trip is blocked by removing the high voltage to the detectors;

- on decreasing power, the P-6 interlock automatically energizes the NIS source range detectors and enables the NIS Source Range Neutron Flux reactor trip; and

The LCO requires two channels of Intermediate Range Neutron Flux, P-6 interlock to be OPERABLE in MODE 2 when below the P-6 interlock setpoint.

Above the P-6 interlock setpoint, the NIS Source Range Neutron Flux reactor trip will be blocked, and this Function will no longer be necessary.

In MODE 3, 4, 5, or 6, the P-6 interlock does not have to be OPERABLE because the NIS Source Range is providing core protection if required.

The Allowable Value is NA for this function because there is no corresponding analytical limit modeled in the accident analysis. The surveillance acceptance criterion used for this Function is ≥3.1E-11 Amps.

NYPA

b. Low Power Reactor Trips Block, P-7

The Low Power Reactor Trips Block, P-7 interlock, is actuated by input from either the Power Range Neutron Flux, P-10, or the Turbine First Stage Pressure. The LCO requirement for the P-7 interlock ensures that the following Functions are performed:

(1) on increasing power, the P-7 interlock (i.e., 2 of 4 Power Range channels increasing above the P-10 (Function 17.d) setpoint or 1 of 2 Turbine First Stage Pressure (Function 17.e) setpoint) automatically enables reactor trips on the following Functions:

(continued)

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

- Pressurizer Pressure - Low;
- Pressurizer Water Level - High;
- Reactor Coolant Flow - Low (Two Loops);
- RCPs Breaker Open (Two Loops);
- Undervoltage RCPs; and
- Underfrequency RCPs.

Am 192

These reactor trips are only required when operating above the P-7 setpoint (approximately 10% power). The reactor trips provide protection against violating the DNBR limit. Below the P-7 setpoint, the RCS is capable of providing sufficient natural circulation without any RCP running.

(2) on decreasing power, the P-7 interlock (i.e., 3 of 4 Power Range channels decreasing below the P-10 (Function 17.d) setpoint and 2 of 2 Turbine First Stage Pressure channels decreasing below the Turbine First Stage Pressure (Function 17.e) setpoint) automatically blocks reactor trips on the following Functions:

- Pressurizer Pressure - Low;
- Pressurizer Water Level - High;
- Reactor Coolant Flow - Low (Two Loops);
- RCP Breaker Position (Two Loops);
- Undervoltage RCPs; and
- Underfrequency RCPs

Am 192

(continued)

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

An Allowable Value is not applicable to the P-7 interlock because it is a logic Function. The Allowable Value for the P-10 interlock (Function 17.d) governs input from the Power Range instruments and the Allowable Value for the Turbine First Stage Pressure interlock (Function 17.e) governs input for turbine power.

The P-7 interlock is a logic Function with train and not channel identity. Therefore, the LCO requires one channel per train (i.e., two trains) of Low Power Reactor Trips Block, P-7 interlock to be OPERABLE in MODE 1.

The low power trips are blocked below the P-7 setpoint and unblocked above the P-7 setpoint. In MODE 2, 3, 4, 5, or 6, this Function does not have to be OPERABLE because the interlock performs its Function when power level drops below 10% power, which is in MODE 1.

c. <u>Power Range Neutron Flux, P-8</u>

The Power Range Neutron Flux, P-8 interlock is actuated at approximately 50% power as determined by NIS power range detectors. The P-8 interlock automatically enables the Reactor Coolant Flow - Low (Single Loop) and RCP Breaker Position (Single Loop) reactor trips on low flow in one or more RCS loops whenever at least 2 of 4 of the Power Range instruments increase to above the P-8 setpoint. The LCO requirement for this trip Function ensures that protection is provided against a loss of flow in any RCS loop that could result in DNB conditions in the core when greater than approximately 50% power. On decreasing power, the reactor trip on low flow in any loop is automatically blocked whenever at least 3 of 4 the Power Range instruments decrease to below the P-8 setpoint.

The LCO requires four channels of Power Range Neutron Flux, P-8 interlock to be OPERABLE in MODE 1.

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APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

In MODE 1, a loss of flow in one RCS loop could result in DNB conditions, so the Power Range Neutron Flux, P-8 interlock must be OPERABLE. In MODE 2, 3, 4, 5, or 6, this Function does not have to be OPERABLE because the core is not producing sufficient power to be concerned about DNB conditions.

The Allowable Value is NA for this Function because there is no corresponding analytical limit modeled in the accident analysis. The surveillance acceptance criterion used for this Function is ≤50% RTP.

NYPA

d. Power Range Neutron Flux, P-10

The Power Range Neutron Flux, P-10 interlock is actuated at approximately 10% power, as determined by two-out-of-four NIS power range detectors. If power level falls below 10% RTP on 3 of 4 channels, the nuclear instrument trips will be automatically unblocked. The LCO requirement for the P-10 interlock ensures that the following Functions are performed:

- on increasing power, the P-10 interlock allows the operator to manually block the Intermediate Range Neutron Flux reactor trip;
- on increasing power, the P-10 interlock allows the operator to manually block the Power Range Neutron Flux – Low reactor trip;
- on increasing power, the P-10 interlock automatically provides a backup signal to block the Source Range Neutron Flux reactor trip by de-energizing the NIS source range detectors;
- the P-10 interlock provides one of the two inputs to the P-7 interlock; and

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

- on decreasing power, the P-10 interlock automatically enables the Power Range Neutron Flux - Low reactor trip and the Intermediate Range Neutron Flux reactor trip (and rod stop).

The LCO requires four channels of Power Range Neutron Flux, P-10 interlock to be OPERABLE in MODE 1 or 2.

OPERABILITY in MODE 1 ensures the Function is available to perform its decreasing power Functions in the event of a reactor shutdown. This Function must be OPERABLE in MODE 2 to ensure that core protection is provided during a startup or shutdown by the Power Range Neutron Flux - Low and Intermediate Range Neutron Flux reactor trips. In MODE 3, 4, 5, or 6, this Function does not have to be OPERABLE because the reactor is not at power and the Source Range Neutron Flux reactor trip provides core protection.

The Allowable Value is NA for this Function because there is no corresponding analytical limit modeled in the accident analysis. The surveillance acceptance criterion used for this Function is ≤10% RTP.

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NYPA

e. Turbine First Stage Pressure

The Turbine First Stage Pressure interlock is actuated when the pressure in the first stage of the high pressure turbine is greater than approximately 10% of the rated full power pressure. This is determined by one-out-of-two pressure detectors. The LCO requirement for this Function ensures that one of the inputs to the P-7 interlock is available.

The LCO requires two channels of Turbine Impulse Pressure, input to the P-7 interlock, to be OPERABLE in MODE 1.

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APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

The Turbine First Stage Pressure interlock must be OPERABLE when the turbine generator is operating. The interlock Function is not required OPERABLE in MODE 2, 3, 4, 5, or 6 because the turbine generator is not operating.

The Allowable Value is NA for this Function because there is no corresponding analytical limit modeled in the accident analysis. The surveillance acceptance criterion used for this Function is ≤10% RTP.

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NYPA

18. Reactor Trip Breakers

This trip Function applies to the RTBs exclusive of individual trip mechanisms. The LCO requires two OPERABLE trains of trip breakers. A trip breaker train consists of all trip breakers associated with a single RPS logic train that are racked in, closed, and capable of supplying power to the Rod Control System. Thus, the train may consist of the main breaker, bypass breaker, or main breaker and bypass breaker, depending upon the system configuration. Two OPERABLE trains ensure no single random failure can disable the RPS trip capability.

The LCO requires two OPERABLE trains of trip breakers. Two OPERABLE trains ensure no single random failure can disable the RPS trip capability. When a reactor trip breaker is being tested, both reactor trip breaker and the reactor trip bypass breaker associated with the RPS logic train not in test are closed. In this configuration, a single failure in the RPS logic train not in test could disable RPS trip capability; therefore, limits on the duration of testing are established.

These trip Functions must be OPERABLE in MODE 1 or 2 when the reactor is critical. In MODE 3, 4, or 5, these RPS trip Functions must be OPERABLE when the Rod Control System is capable of rod withdrawal or one or more rods are not fully inserted.

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(continued)

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

19. Reactor Trip Breaker Undervoltage and Shunt Trip Mechanisms

The LCO requires both the Undervoltage and Shunt Trip Mechanisms to be OPERABLE for each RTB that is in service. The trip mechanisms are not required to be OPERABLE for trip breakers that are open, racked out, incapable of supplying power to the Rod Control System, or declared inoperable under Function 18 above. OPERABILITY of both trip mechanisms on each breaker ensures that no single trip mechanism failure will prevent opening any breaker on a valid signal.

These trip Functions must be OPERABLE in MODE 1 or 2 when the reactor is critical. In MODE 3, 4, or 5, these RPS trip Functions must be OPERABLE when the Rod Control System is capable of rod withdrawal or one or more rods are not fully inserted. RAI-12

20. Automatic Trip Logic

The LCO requirement for the RTBs (Functions 18 and 19) and Automatic Trip Logic (Function 20) ensures that means are provided to interrupt the power to allow the rods to fall into the reactor core. Each RTB is equipped with a bypass breaker (RTBB) to allow testing of the trip breaker while the unit is at power. Each RTB and RTBB is equipped with an undervoltage coil and a shunt trip coil to trip the breaker open when needed. The reactor trip signals generated by the RPS Automatic Trip Logic cause the RTBs and associated bypass breakers to open and shut down the reactor.

The LCO requires two trains of RPS Automatic Trip Logic to be OPERABLE. Having two OPERABLE channels ensures that random failure of a single logic channel will not prevent reactor trip.

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

These trip Functions must be OPERABLE in MODE 1 or 2 when the reactor is critical. In MODE 3, 4, or 5, these RPS trip Functions must be OPERABLE when the Rod Control System is capable of rod withdrawal or one or more rods are not fully inserted. RAI-12

The RPS instrumentation satisfies Criterion 3 of 10 CFR 50.36.

ACTIONS

A Note has been added to the ACTIONS to clarify the application of Completion Time rules. The Conditions of this Specification may be entered independently for each Function listed in Table 3.3.1-1. RAI-02

In the event a channel's Trip Setpoint is found nonconservative with respect to the Allowable Value, or the transmitter, instrument loop, signal processing electronics, or bistable is found inoperable, then all affected Functions provided by that channel must be declared inoperable and the LCO Condition(s) entered for the protection Function(s) affected.

When the number of inoperable channels in a trip Function exceed those specified in one or other related Conditions associated with a trip Function, then the unit is outside the safety analysis. Therefore, LCO 3.0.3 must be immediately entered if applicable in the current MODE of operation.

A.1

Condition A applies to all RPS protection Functions. Condition A addresses the situation where one or more required channels or trains for one or more Functions are inoperable at the same time. The Required Action is to refer to Table 3.3.1-1 and to take the Required Actions for the protection functions affected. The Completion Times are those from the referenced Conditions and Required Actions.

(continued)

ACTIONS
(continued)

B.1 and B.2

Condition B applies to the Manual Reactor Trip in MODE 1 or 2. This action addresses the train orientation of the relay logic for this Function. With one channel inoperable, the inoperable channel must be restored to OPERABLE status within 48 hours. In this Condition, the remaining OPERABLE channel is adequate to perform the safety function.

The Completion Time of 48 hours is reasonable considering that there are two automatic actuation trains and another manual initiation channel OPERABLE, and the low probability of an event occurring during this interval.

If the Manual Reactor Trip Function cannot be restored to OPERABLE status within the allowed 48 hour Completion Time, the unit must be brought to a MODE in which the requirement does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 additional hours (54 hours total time). The 6 additional hours to reach MODE 3 is reasonable, based on operating experience, to reach MODE 3 from full power operation in an orderly manner and without challenging unit systems. With the unit in MODE 3, ACTION C applies to any inoperable Manual Reactor Trip Function if the Rod Control System is capable of rod withdrawal or one or more rods are not fully inserted.

RAI-12

C.1 and C.2

Condition C applies to the following reactor trip Functions in MODE 3, 4, or 5 when the Rod Control System capable of rod withdrawal or one or more rods are not fully inserted:

RAI-12

- Manual Reactor Trip;
- RTBs;
- RTB Undervoltage and Shunt Trip Mechanisms; and
- Automatic Trip Logic.

(continued)

BASES

ACTIONS

C.1 and C.2 (continued)

This action addresses the train orientation of the relay logic for these Functions. With one channel or train inoperable, the inoperable channel or train must be restored to OPERABLE status within 48 hours. If the affected Function(s) cannot be restored to OPERABLE status within the allowed 48 hour Completion Time, the unit must be placed in a MODE in which the requirement does not apply. To achieve this status, action must be initiated within the same 48 hours to ensure that all rods are fully inserted, and the Rod Control System must be placed in a condition incapable of rod withdrawal within the next hour. The additional hour provides sufficient time to accomplish the action in an orderly manner. With rods fully inserted and the Rod Control System incapable of rod withdrawal, these Functions are no longer required.

The Completion Time is reasonable considering that in this Condition, the remaining OPERABLE train is adequate to perform the safety function, and given the low probability of an event occurring during this interval.

D.1 and D.2

RAI-03

Condition D applies to the Power Range Neutron Flux-High Function.

The NIS power range detectors provide input to the Rod Control System and, therefore, have a two-out-of-four trip logic. A known inoperable channel must be placed in the tripped condition. This results in a partial trip condition requiring only one-out-of-three logic for actuation. The 6 hours allowed to place the inoperable channel in the tripped condition is justified in WCAP-10271-P-A (Ref. 7).

RAI-03

The 6 hour Completion Time is consistent with LCO 3.2.4, "QUADRANT POWER TILT RATIO (QPTR)."

(continued)

BASES

ACTIONS

D.1 and D.2 (continued)

As an alternative to the above Actions, the plant must be placed in a MODE where this Function is no longer required OPERABLE. Twelve hours are allowed to place the plant in MODE 3. This is a reasonable time, based on operating experience, to reach MODE 3 from full power in an orderly manner and without challenging plant systems. If Required Actions cannot be completed within their allowed Completion Times, LCO 3.0.3 must be entered.

The Required Actions have been modified by a Note that allows placing the inoperable channel in the bypass condition for up to 8 hours while performing routine surveillance testing of other channels. The Note also allows placing the inoperable channel in the bypass condition to allow setpoint adjustments of other channels when required to reduce the setpoint in accordance with other Technical Specifications. The 8 hour time limit is justified in Reference 7.

RAI-03

E.1 and E.2

Condition E applies to the following reactor trip Functions:

- Power Range Neutron Flux - Low;
- Overtemperature ΔT;
- Overpower ΔT;
- Pressurizer Pressure - High;
- SG Water Level - Low Low; and
- SG Water Level - Low coincident with Steam Flow/Feedwater Flow Mismatch.

(continued)

BASES

ACTIONS

E.1 and E.2 (continued)

A known inoperable channel must be placed in the tripped condition within 6 hours. Placing the channel in the tripped condition results in a partial trip condition requiring only one-out-of-two logic for actuation of the two-out-of-three trips and one-out-of-three logic for actuation of the two-out-of-four trips. The 6 hours allowed to place the inoperable channel in the tripped condition is justified in Reference 7.

If the operable channel cannot be placed in the trip condition within the specified Completion Time, the unit must be placed in a MODE where these Functions are not required OPERABLE. An additional 6 hours is allowed to place the unit in MODE 3. Six hours is a reasonable time, based on operating experience, to place the unit in MODE 3 from full power in an orderly manner and without challenging unit systems.

The Required Actions have been modified by a Note that allows placing the inoperable channel in the bypassed condition for up to 8 hours while performing routine surveillance testing of the other channels. The 8 hour time limit is justified in Reference 7.

F.1 and F.2

Condition F applies when there are no Intermediate Range Neutron Flux trip channels OPERABLE in MODE 2 when THERMAL POWER is above the P-6 setpoint and below the P-10 setpoint. Required Actions specified in this Condition are only applicable when channel failures do not result in reactor trip. Above the P-6 setpoint and below the P-10 setpoint, the NIS intermediate range detector performs the monitoring Functions. With no intermediate range channels OPERABLE, the Required Actions are to suspend operations involving positive reactivity additions immediately. This will preclude any power level increase since there are no OPERABLE Intermediate Range Neutron Flux channels. The operator must also reduce THERMAL POWER below the P-6 setpoint within two hours. Below P-6, one or both Source Range Neutron Flux channels will be able to monitor the core power level. The Completion Time of

(continued)

BASES

ACTIONS

F.1 and F.2 (continued)

2 hours will allow a slow and controlled power reduction to less than the P-6 setpoint and takes into account the low probability of occurrence of an event during this period that may require the protection afforded by the NIS Intermediate Range Neutron Flux trip.

G.1

Condition G applies when there are no Source Range Neutron Flux trip channels OPERABLE when in MODE 2, below the P-6 setpoint, and in MODE 3, 4, or 5 with the Rod Control capable of rod withdrawal or one or more rods not rods fully inserted. With the unit in this Condition, below P-6, the NIS source range performs the monitoring and protection functions. With both source range channels inoperable, the RTBs must be opened immediately. With the RTB's open, the core is in a more stable condition.

RAI-12

RAI-13

H.1 and H.2

Condition H applies to the following reactor trip Functions:

- Pressurizer Pressure - Low;
- Pressurizer Water Level - High;
- Reactor Coolant Flow - Low;
- RCP Breaker Position (Two Loops);
- Undervoltage RCPs; and
- Underfrequency RCPs.

With one channel inoperable, the inoperable channel must be placed in the tripped condition within 6 hours. Placing the channel in the tripped condition results in a partial trip condition requiring only one additional channel to initiate a reactor trip above the P-7 setpoint for the two loop function and above the P-8 setpoint for the single loop function.

(continued)

ACTIONS

H.1 and H.2 (continued)

These Functions do not have to be OPERABLE below the P-7 setpoint because there are no loss of flow trips below the P-7 setpoint. The 6 hours allowed to place the channel in the tripped condition is justified in Reference 7. An additional 6 hours is allowed to reduce THERMAL POWER to below P-7 if the inoperable channel cannot be restored to OPERABLE status or placed in trip within the specified Completion Time. The Reactor Coolant Flow-Low (Single Loop) reactor trip does not have to be OPERABLE below the P-8 setpoint; however, the Required Action must take the plant below the P-7 setpoint if the inoperable channel is not tripped within 6 hour because of the shared components between this function and the Reactor Coolant Flow-Low (Two Loop) reactor trip function.

Allowance of this time interval takes into consideration the redundant capability provided by the remaining redundant OPERABLE channel, and the low probability of occurrence of an event during this period that may require the protection afforded by the Functions associated with Condition H.

The Required Actions have been modified by a Note that allows placing the inoperable channel in the bypassed condition for up to 8 hours while performing routine surveillance testing of the other channels. The 8 hour time limit is justified in Reference 7.

I.1 and I.2

Condition I applies to the RCP Breaker Position (Single Loop) reactor trip Function. There is one breaker position device per RCP breaker. With one channel inoperable, the inoperable channel must be restored to OPERABLE status within 6 hours. If the channel cannot be restored to OPERABLE status within the 6 hours, then THERMAL POWER must be reduced below the P-8 setpoint within the next 4 hours.

This places the unit in a MODE where the LCO is no longer applicable. This Function does not have to be OPERABLE below the P-8 setpoint because other RPS Functions provide core protection below the P-8 setpoint. The 6 hours allowed to restore the

(continued)

ACTIONS

I.1 and I.2 (continued)

channel to OPERABLE status and the 4 additional hours allowed to reduce THERMAL POWER to below the P-8 setpoint are justified in Reference 7.

The Required Actions have been modified by a Note that allows placing the inoperable channel in the bypassed condition for up to 8 hours while performing routine surveillance testing of the other channels. The 8 hour time limit is justified in Reference 7.

J.1 and J.2

Condition J applies to Turbine Trip on Low Auto-Stop Oil Pressure. With one channel inoperable, the inoperable channel must be placed in the trip condition within 6 hours. If placed in the tripped condition, this results in a partial trip condition requiring only one additional channel to initiate a reactor trip. If the channel cannot be restored to OPERABLE status or placed in the trip condition, then power must be reduced below the P-8 setpoint within the next 6 hours. The 6 hours allowed to place the inoperable channel in the tripped condition and the 10 hours allowed for reducing power are justified in Reference 7. RAI-05

The Required Actions have been modified by a Note that allows placing the inoperable channel in the bypassed condition for up to 8 hours while performing routine surveillance testing of the other channels. The 8 hour time limit is justified in Reference 7.

K.1 and K.2

Condition K applies to the SI Input from ESFAS reactor trip and the RPS Automatic Trip Logic in MODES 1 and 2. These actions address the train orientation of the RPS for these Functions. With one train inoperable, 6 hours are allowed to restore the train to OPERABLE status (Required Action K.1) or the unit must be placed in MODE 3 within the next 6 hours. The Completion Time of 6 hours (Required Action K.1) is reasonable considering that in this Condition, the remaining OPERABLE train is adequate to

(continued)

BASES

ACTIONS

K.1 and K.2 (continued)

perform the safety function and given the low probability of an event during this interval. The Completion Time of 6 hours (Required Action K.2) is reasonable, based on operating experience, to reach MODE 3 from full power in an orderly manner and without challenging unit systems.

The Required Actions have been modified by a Note that allows bypassing one train up to 8 hours for surveillance testing, provided the other train is OPERABLE.

L.1 and L.2

Condition L applies to the RTBs in MODES 1 and 2. These actions address the train orientation of the RPS for the RTBs. With one train inoperable, 1 hour is allowed to restore the train to OPERABLE status or the unit must be placed in MODE 3 within the next 6 hours. The Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 from full power in an orderly manner and without challenging unit systems. The 1 hour and 6 hour Completion Times are equal to the time allowed by LCO 3.0.3 for shutdown actions in the event of a complete loss of RPS Function. Placing the unit in MODE 3 results in ACTION C entry while RTB(s) are inoperable.

The Required Actions have been modified by two Notes. Note 1 allows one channel to be bypassed for up to 2 hours for surveillance testing, provided the other channel is OPERABLE. Note 2 allows one RTB to be bypassed for up to 2 hours for maintenance on undervoltage or shunt trip mechanisms if the other RTB train is OPERABLE. The 2 hour time limit is justified in Reference 7.

As noted in Reference 9, the allowance of 2 hours for test and maintenance of reactor trip breakers provided in Condition L, Note 1, is less than the 6 hour allowable out of service time and the 8 hour allowance for testing of RPS train A and train B. In practice, if the reactor trip breaker is being tested at the same time as the associated logic train, the 8 hour allowance for testing of RPS train A and train B applies to both the logic train and the reactor trip breaker. This is acceptable based on the Safety Evaluation Report for Reference 7.

RAI-02

(continued)

BASES

ACTIONS
(continued)

M.1 and M.2

Condition M applies to the P-6 and P-10 interlocks. With one or more channels inoperable for one-out-of-two or two-out-of-four coincidence logic, the associated interlock must be verified to be in its required state for the existing unit condition within 1 hour or the unit must be placed in MODE 3 within the next 6 hours. Verifying the interlock status manually accomplishes the interlock's Function. The Completion Time of 1 hour is based on operating experience and the minimum amount of time allowed for manual operator actions. The Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 from full power in an orderly manner and without challenging unit systems. The 1 hour and 6 hour Completion Times are equal to the time allowed by LCO 3.0.3 for shutdown actions in the event of a complete loss of RPS Function.

N.1 and N.2

Condition N applies to the P-7 and P-8 interlocks and the turbine first stage pressure input to P-7. With one or more channels inoperable for one-out-of-two or two-out-of-four coincidence logic, the associated interlock must be verified to be in its required state for the existing unit condition within 1 hour or the unit must be placed in MODE 2 within the next 6 hours. These actions are conservative for the case where power level is being raised. Verifying the interlock status manually accomplishes the interlock's Function. The Completion Time of 1 hour is based on operating experience and the minimum amount of time allowed for manual operator actions. The Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 2 from full power in an orderly manner and without challenging unit systems.

(continued)

BASES

ACTIONS
(continued)

O.1 and O.2

Condition O applies to the RTB Undervoltage and Shunt Trip Mechanisms, or diverse trip features, in MODES 1 and 2. With one of the diverse trip features inoperable, it must be restored to an OPERABLE status within 48 hours or the unit must be placed in a MODE where the requirement does not apply. This is accomplished by placing the unit in MODE 3 within the next 6 hours (54 hours total time). The Completion Time of 6 hours is a reasonable time, based on operating experience, to reach MODE 3 from full power in an orderly manner and without challenging unit systems.
With the unit in MODE 3, ACTION C applies to any inoperable RTB trip mechanism. The affected RTB shall not be bypassed while one of the diverse features is inoperable except for the time required to perform maintenance to one of the diverse features. The allowable time for performing maintenance of the diverse features is 2 hours for the reasons stated under Condition L.

RAI-06

The Completion Time of 48 hours for Required Action O.1 is reasonable considering that in this Condition there is one remaining diverse feature for the affected RTB, and one OPERABLE RTB capable of performing the safety function and given the low probability of an event occurring during this interval.

SURVEILLANCE REQUIREMENTS

The SRs for each RPS Function are identified by the SRs column of Table 3.3.1-1 for that Function.

A Note has been added to the SR Table stating that Table 3.3.1-1 determines which SRs apply to which RPS Functions.

Note that each channel of process protection supplies both train A and train B of the RPS. When testing an individual channel, the SR is not met until both train A and train B logic are tested. The CHANNEL CALIBRATION and COTs are performed in a manner that is consistent with the assumptions used in analytically calculating the required channel accuracies.

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.1

Performance of the CHANNEL CHECK once every 12 hours ensures that gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels or of something more serious. A CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying that the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the unit staff based on a combination of the channel instrument uncertainties, including indication and readability. If a channel is outside the criteria, it may be an indication that the sensor or the signal processing equipment has drifted outside its limit.

The Frequency is based on operating experience that demonstrates channel failure is rare. The CHANNEL CHECK supplements less formal checks of channels during normal operational use of the displays associated with the LCO required channels.

SR 3.3.1.2

SR 3.3.1.2 compares the calorimetric heat balance calculation to the NIS channel output every 24 hours. If the calorimetric exceeds the NIS channel output by > 2% RTP, the NIS is not declared inoperable, but must be adjusted. If the NIS channel output cannot be properly adjusted, the channel is declared inoperable.

Two Notes modify SR 3.3.1.2. The first Note indicates that the NIS channel output shall be adjusted consistent with the calorimetric results if the absolute difference between the NIS channel output and the calorimetric is > 2% RTP. The second Note clarifies that this Surveillance is required only if reactor power is ≥ 15% RTP and

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.1.2 (continued)

that 24 hours is allowed for performing the first Surveillance after reaching 15% RTP. At lower power levels, calorimetric data are inaccurate.

The Frequency of every 24 hours is adequate. It is based on unit operating experience, considering instrument reliability and operating history data for instrument drift. Together these factors demonstrate the change in the absolute difference between NIS and heat balance calculated powers rarely exceeds 2% in any 24 hour period.

In addition, control room operators periodically monitor redundant indications and alarms to detect deviations in channel outputs.

SR 3.3.1.3

SR 3.3.1.3 compares the incore system to the NIS channel output every 31 EFPD. If the absolute difference is ≥ 3%, the NIS channel is still OPERABLE, but must be readjusted.

If the NIS channel cannot be properly readjusted, the channel is declared inoperable. This Surveillance is performed to verify the f(ΔI) input to the overtemperature ΔT Function.

Two Notes modify SR 3.3.1.3. Note 1 indicates that the excore NIS channel shall be adjusted if the absolute difference between the incore and excore AFD is ≥ 3%. SR 3.3.1.3 is performed to ensure that the AFD input to the Overtemperature Delta T and the system used to monitor LCO 3.2.3, AFD, are within acceptable limits. The limiting AFD is established to provide the required margin when operating at the highest power level. As power level decreases, the thermal limit becomes less sensitive to AFD because the overall margin to the thermal limit increases. Note 2 clarifies that the Surveillance is required only if reactor power is ≥ 90% because the requirements of LCO 3.2.3, Axial Flux Difference (AFD), are relaxed significantly below 90% RTP.

RA-08

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.3.1.3 (continued)

The Frequency of every 31 EFPD is adequate. It is based on unit operating experience, considering instrument reliability and operating history data for instrument drift. Also, the slow changes in neutron flux during the fuel cycle can be detected during this interval.

SR 3.3.1.4

SR 3.3.1.4 is the performance of a TADOT every 31 days on a STAGGERED TEST BASIS. This test shall verify OPERABILITY by actuation of the end devices.

The RTB test shall include separate verification of the undervoltage and shunt trip mechanisms. Independent verification of RTB undervoltage and shunt trip Function is not required for the bypass breakers. No capability is provided for performing such a test at power. The independent test of the undervoltage and shunt trip function for bypass breakers is included in SR 3.3.1.14. The bypass breaker test shall include a local shunt trip. A Note has been added to indicate that this test must be performed on the bypass breaker prior to placing it in service.

The Frequency of every 31 days on a STAGGERED TEST BASIS is adequate. It is based on industry operating experience, considering instrument reliability and operating history data.

SR 3.3.1.5

SR 3.3.1.5 is the performance of an ACTUATION LOGIC TEST. The RPS relay logic is tested every 31 days on a STAGGERED TEST BASIS. The train being tested is placed in the bypass condition,thus preventing inadvertent actuation. All possible logic combinations, with and without applicable permissives, are tested for each protection function required by Table 3.31-1. The Frequency of every 31 days on a STAGGERED TEST BASIS is adequate. It is based on industry operating experience, considering instrument reliability and operating history data.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.6

SR 3.3.1.6 is a calibration of the excore channels to the incore channels. If the measurements do not agree, the excore channels are not declared inoperable but must be calibrated to agree with the incore detector measurements. If the excore channels cannot be adjusted, the channels are declared inoperable. This Surveillance is performed to verify the f(ΔI) input to the overtemperature ΔT Function.

A Note modifies SR 3.3.1.6. The Note states that this Surveillance is required only if reactor power is > 90% because the requirements of LCO 3.2.3, Axial Flux Difference (AFD), are relaxed significantly below 90% RTP. SR 3.3.1.6 is performed to ensure that the AFD input to the Overtemperature Delta T and the system used to monitor LCO 3.2.3 AFD are within acceptable limits. The limiting AFD is established to provide the required margin when operating at the highest power level. As power level decreases, the thermal limit becomes less sensitive to AFD because the overall margin to the thermal limit increases.

RAI-08

The Frequency of 31 EFPD is adequate based on operating experience, considering instrument reliability and operating history data for instrument drift.

SR 3.3.1.7

SR 3.3.1.7 is the performance of a COT every 92 days.

A COT is performed on each required channel to ensure the entire channel will perform the intended Function.

Setpoints must be within the Allowable Values specified in Table 3.3.1-1.

The "as found" and "as left" values must also be recorded and reviewed. The difference between the current "as found" values and the previous test "as left" values must be consistent with the drift

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.3.1.7 (continued)

allowance used in the setpoint methodology. The setpoint shall be left set consistent with the assumptions of Reference 6 which incorporates the requirements of Reference 7.

SR 3.3.1.7 is modified by a Note that provides a 4 hour delay in the requirement to perform this Surveillance for source range instrumentation when entering MODE 3 from MODE 2. This Note allows a normal shutdown to proceed without a delay for testing in MODE 2 and for 4 hours in MODE 3 until the RTBs are open and SR 3.3.1.7 is no longer required to be performed. If the unit is to be in MODE 3 with the RTBs closed for > 4 hours this Surveillance must be performed prior to 4 hours after entry into MODE 3. The 4 hour deferral is needed because the testing required by SR 3.3.1.7 and SR 3.3.1.8 cannot be performed on the Source Range, Intermediate Range and Power Range Instruments until in the Applicable Mode and the proximity of these instruments prevents working on more than one instrument at any one time.

RAI-09

The Frequency of 92 days is justified in Reference 7.

SR 3.3.1.8

SR 3.3.1.8 is the performance of a COT as described in SR 3.3.1.7, except it is modified by a Note that this test shall include verification that the P-6 and P-10 interlocks are in their required state for the existing unit condition. The Frequency is modified by a Note that allows this surveillance to be satisfied if it has been performed within 92 days of the Frequencies prior to reactor startup and 12 hours after reducing power below P-10 and 4 hours after reducing power below P-6. The Frequency of "prior to startup" ensures this surveillance is performed prior to critical operations and applies to the source, intermediate and power range low instrument channels. The Frequency of "12 hours after reducing power below P-10" (applicable to intermediate and power range low channels) and "4 hours after reducing power below P-6" (applicable to source range channels) allows a normal shutdown to be completed

RAI-10

RAI-10

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.1.8 (continued)

and the unit removed from the MODE of Applicability for this surveillance without a delay to perform the testing required by this surveillance. The Frequency of every 92 days thereafter applies if the plant remains in the MODE of Applicability after the initial performances of prior to reactor startup. Additionally, this SR must be completed for the intermediate and power range low channels within 12 hours after reducing power below the P-10 setpoint and must be completed for the source range low channel within 4 hours after reducing power below the P-6 setpoint. The MODE of Applicability for this surveillance is < P-10 for the power range low and intermediate range channels and < P-6 for the source range channels. Once the unit is in MODE 3, this surveillance is no longer required. If power is to be maintained < P-10 for more than 12 hours or < P-6 for more than 4 hours, then the testing required by this surveillance must be performed prior to the expiration of the time limit. The specified Frequency provides a reasonable time to complete the required testing or place the unit in a MODE where this surveillance is no longer required.

RAI-10

RAI-10

This test ensures that the NIS source, intermediate, and power range low channels are OPERABLE prior to taking the reactor critical and within a reasonable time after reducing power into the applicable MODE (< P-10 or < P-6). The deferral of the requirement to perform this test until 12 and 4 hours after entering the Applicable condition is needed because the testing required by SR 3.3.1.7 and SR 3.3.1.8 cannot be performed on the Source Range, Intermediate Range, and Power Range instruments until in the Applicable Mode and the proximity of these instruments prevents working on more than one instrument at any one time.

SR 3.3.1.9

SR 3.3.1.9 is the performance of a TADOT and is performed every 92 days, as justified in Reference 7.

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.3.1.9 (continued)

The SR is modified by a Note that excludes verification of setpoints from the TADOT. Since this SR applies to RCP undervoltage and underfrequency relays, setpoint verification requires elaborate bench calibration and is accomplished during the CHANNEL CALIBRATION.

SR 3.3.1.10

A CHANNEL CALIBRATION is performed at every refueling and every 18 months for function 11. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy.

CHANNEL CALIBRATIONS must be performed consistent with the assumptions used in Reference 6. The difference between the current "as found" values and the previous test "as left" values must be consistent with the drift allowance used in the setpoint methodology.

The Frequency is based on the calibration interval used for the determination of the magnitude of equipment drift in the setpoint methodology.

SR 3.3.1.10 is modified by a Note stating that this test shall include verification that the time constants are adjusted to the prescribed values where applicable.

SR 3.3.1.11

SR 3.3.1.11 is the performance of a CHANNEL CALIBRATION, as described in SR 3.3.1.10, every 24 months. This SR is modified by a Note stating that neutron detectors are excluded from the CHANNEL CALIBRATION. This is needed because the CHANNEL CALIBRATION for the

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.1.11 (continued)

power range neutron detectors consists of a normalization of the detectors based on a power calorimetric and flux map performed above 15% RTP. The CHANNEL CALIBRATION for the source range and intermediate range neutron detectors consists of obtaining the detector plateau or preamp discriminator curves, evaluating those curves, and comparing the curves to the manufacturer's data.

This Surveillance is not required for the NIS power range detectors for entry into MODE 2 or 1, and is not required for the NIS intermediate range detectors for entry into MODE 2, because the unit must be in at least MODE 2 to perform the test for the intermediate range detectors and MODE 1 for the power range detectors. The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed on the 24 month Frequency.

SR 3.3.1.12

SR 3.3.1.12 is the performance of a CHANNEL CALIBRATION, as described in SR 3.3.1.10, every 24 months. This SR is modified by a Note stating that this test shall include verification of the rate lag compensation for flow from the core to the RTDs. Whenever a sensing element is replaced, the next required CHANNEL CALIBRATION of resistance temperature detectors (RTD) sensors, which may consist of an inplace qualitative assessment of sensor behavior and normal calibration of the remaining adjustable devices in the channel, is accomplished by an inplace cross calibration that compares the other sensing elements with the recently installed element.

The Frequency is justified by the assumption of a 24 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.13

SR 3.3.1.13 is the performance of a COT of RPS interlocks every 24 months.

The Frequency is based on the known reliability of the interlocks and the multichannel redundancy available, and has been shown to be acceptable through operating experience.

SR 3.3.1.14

SR 3.3.1.14 is the performance of a TADOT of the Manual Reactor Trip, RCP Breaker Position, Turbine Trip, and the SI Input from ESFAS. This TADOT is performed every 24 months. The test shall independently verify the OPERABILITY of the undervoltage and shunt trip mechanisms for the Manual Reactor Trip Function for the Reactor Trip Breakers and Reactor Trip Bypass Breakers. The Reactor Trip Bypass Breaker test shall include testing of the automatic undervoltage trip.

RAI-17

The Frequency is based on the known reliability of the Functions and the multichannel redundancy available, and has been shown to be acceptable through operating experience. The SR is modified by a Note that excludes verification of setpoints from the TADOT. The Functions affected have no setpoints associated with them.

NYPA

REFERENCES

1. FSAR, Chapter 7.
2. FSAR, Chapter 6.
3. FSAR, Chapter 14.
4. IEEE-279-1968
5. 10 CFR 50.49.

(continued)

BASES

REFERENCES (continued)

6. Engineering Standards Manual IES-3 and IES-3B, Instrument Loop Accuracy and Setpoint Calculation Methodology (IP3).

7. WCAP-10271-P-A, Supplement 2, Rev. 1, June 1990.

8. Consolidated Edison Company of New York, Inc. Indian Point Nuclear Generating Station Unit No. 3 Plant Manual Volume VI: Precautions, Limitations, and Setpoints, March 1975.

9. WCAP-14384, Implementation of RPS Technical Specification Relaxation Programs, Rev. 0, January 1996.

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.3.1:
"RPS INSTRUMENTATION"

PART 2:

CURRENT TECHNICAL SPECIFICATION PAGES

Annotated to show differences between CTS and ITS

CTS PAGE	AMENDMENT FOR REV O SUBMITTAL	AMENDMENT FOR REV 1 SUBMITTAL	COMMENT
2.3-1	0	0	
2.3-2	177	177	
2.3-3	175	175	
2.3-4	86	192	Reactor trip on turbine trip changed to P-8
2.3-5	175	175	
2.3-6	101	192	Reactor trip on turbine trip changed to P-8
2.3-7	68	192	Reactor trip on turbine trip changed to P-8
3.5-1	26	26	
3.5-2	65	65	
3.5-7	154	154	
3.5-8	154	154	
3.5-9	154	154	
T 3.5-2 (1)	93	93	
T 3.5-2 (2)	93	192	Reactor trip on turbine trip changed to P-8
T 3.5-2 (3)	93	93	
3.11-1	122	122	
4.1-1	97	97	
4.1-3	148	148	
4.1-4	107	107	
4.1-5	107; 97-156	182	SR Freq for turbine stop and control valves
T 4.1-1 (1)	170; 98-043	185	Extend instrument SR to 24 month
T 4.1-1 (2)	169	200	Relocate CVCS requirements
T 4.1-1 (3)	168; 98-043	185 192	Extend instrument SR to 24 month Reactor trip on turbine trip changed to P-8
T 4.1-1 (5)	169; 98-043	185	Extend instrument SR to 24 months
T 4.1-1 (6)	181; 98-043	185	One time extension for SR
4.5-1	142	142	

A.1

Amend 192 — ≥ 50% RTP | R.1

~~C. Other reactor trips~~

T3.3.1-1, #8 (1) High pressurizer water level - ≤ ~~92%~~ 97.47% of span. L.1 A.12

T3.3.1-1, #13 (2) Low-low steam generator water level - ≥ ~~5%~~ 3.54% of narrow range instrument span. L.1 A.19

T3.3.1-1, #15, Note h (3) ~~Anticipatory reactor trip upon~~ turbine trip. Auto Stop Oil Press ≥ 1.6 psig A.21

T3.3.1-1, #17 ~~2.~~ Protective instrumentation ~~settings~~ Allowable Values for reactor trip interlocks shall satisfy the following conditions: L.1

T3.3.1-1, 9 Notes e, g. ~~A.~~ The reactor trips on low pressurizer pressure, high pressurizer level, low reactor coolant flow for two or more loops, and ~~turbine trip~~ shall be unblocked when: Amend 192

T3.3.1-1, #17.d ~~(1)~~ ~~Power range nuclear flux ≥ 10% of rated power~~ P-10, ≤ 10% RTP, or A.29

T3.3.1-1, #17.e ~~(2)~~ P-7 input Turbine first stage pressure ~~≥ 10% of equivalent full load~~ ≤ 10% turbine power. A.30

T3.3.1-1, Note k ~~The reactor trip on turbine trip may be blocked at power levels ≥10% during turbine overspeed surveillance testing.~~ A.21

T3.3.1-1, #17.c #9 ~~B.~~ The single loop loss of flow reactor trip may be bypassed when the power range nuclear instrumentation indicates ≤ 50% of rated power. The single loop loss-of-flow trip setpoint is hereafter referred to as P-8. A.28

~~**Basis**~~

~~The high flux reactor trip provides redundant protection in the power range for a power excursion beginning from low power. This trip was used in the safety analysis. (1)~~

~~The power range nuclear flux reactor trip high set point protects the reactor core against reactivity excursions which are too rapid to be protected by temperature and pressure protective circuitry. The prescribed set point, with allowance for errors, is consistent with the trip point in the accident analysis. (2) (3)~~

A.1

Add, Function 17.a, P-6 interlock

Add Function 17.b, P-7 interlock

M.10

Add Interlock Operability 2.3.4 for Functions 17.c, 17.d and 17.e

See Amendment 192 Next Page

C. Other reactor trips

(1) High pressurizer water level - ≤ 92% of span.

(2) Low-low steam generator water level - ≥ 5% of narrow range instrument span.

(3) Anticipatory reactor trip upon turbine trip - ≥50% of rated power.

2. Protective instrumentation settings for reactor trip interlocks shall satisfy the following conditions:

A. The reactor trips on low pressurizer pressure, high pressurizer level and low reactor coolant flow for two or more loops shall be unblocked when:

(1) Power range nuclear flux ≥ 10% of rate power, or

(2) Turbine first stage pressure ≥ 10% of equivalent full load.

B. The single loop loss of flow reactor trip and the reactor trip on turbine trip shall be unblocked when the power range nuclear instrumentation indicates ≥50% of rated power (P-8).

Basis

The high flux reactor trip provides redundant protection in the power range for a power excursion beginning from low power. This trip was used in the safety analysis.(1)

The power range nuclear flux reactor trip high setpoint protects the reactor core against reactivity excursions which are too rapid to be protected by temperature and pressure protective circuitry. The prescribed setpoint, with allowance for errors, is consistent with the trip point in the accident analysis.(2)(3)

Add ITS 3.3.1, Function 14, SG Level with Flow Mismatch (A.20) (M.9)

Amendment 192

LA.1 A.34

TABLE 3.5-2 (Sheet 2 of 3)

	REACTOR TRIP INSTRUMENTATION LIMITING OPERATING CONDITIONS						
	NO. FUNCTIONAL UNIT	~~1 NO. OF CHANNELS~~	~~2 NO. OF CHANNELS TO TRIP~~	~~3 MINIMUM OPERABLE CHANNELS~~	~~4 MINIMUM DEGREE OF REDUNDANCY~~	5 OPERATOR ACTION IF CONDITIONS OF COLUMNS 3 OR 4 CANNOT BE MET*	
T3.3.1-1, #13	9. Lo Lo Steam Generator Water Level	~~3/loop~~	~~2/loop~~	~~2/loop~~	~~1/loop~~ 3/SG	~~Maintain hot shutdown~~ Reg Act E.1, E.2	A.19
T3.3.1-1, #11	10. Undervoltage 6.9 KV Bus	~~1/bus~~	~~2~~	~~3~~	~~2~~ 1/bus	~~Maintain hot shutdown~~ Reg Act H.1, H.2	A.17
T3.3.1-1, #12 #10.a #10.b	11. Low Frequency 6.9 KV Bus**	~~1/bus~~	~~2~~	~~3~~	~~2~~ 1/RCP 1/bus	~~Maintain hot shutdown~~ Reg Act I.1, I.2 Reg Act H.1, H.2	A.15 A.16 A.18
T3.3.1-1, #15	12. Turbine Trip: Low auto stop oil pressure	~~3~~	~~2~~	~~2~~	~~1~~ 3	Reg Act J.1, J.2 ~~Maintain reactor power below 10% of full power~~ 50%	A.21
T3.3.1-1, #18 #19	13. Reactor Trip Breakers***	~~2~~	~~1~~	~~2~~	~~1~~ 2 trains 1 each/RTB	Reg Act L.1, L.2 ~~Maintain hot shutdown****~~ L.7 Reg Act O.1, O.2	A.23 A.24 R.1
T3.3.1-1, #20 #16	14. Reactor Protection Relay Logic	~~2~~	~~1~~	~~2~~	~~1~~ 2 trains	~~Maintain hot shutdown****~~ Reg Act K.1, K.2 Reg Act C.1, C.2	A.25 A.22

* Maintain hot shutdown means maintain or ~~proceed to~~ be in hot shutdown within ~~4~~ 6 hours ~~using normal operating procedures,~~ or outside Applicable Mode if the unacceptable condition arises during operation. (M.5) (A.36)

~~** 2/4 trips all four reactor coolant pumps~~ (LA.1)

*** ~~A reactor trip breaker is considered inoperable if any of its components fail to meet test specifications.~~ (A.1) If either the undervoltage or shunt trip device (not both) prevent a breaker from proper operation, then ~~72~~ 48 hours are allowed to restore the failed device to operable status before the ~~affected breaker is declared inoperable~~ Mode 3 in next 6 hours. (M.6)

Reg Act O.1
O.2

Amendment No. 26, 68, 71, 93

ITS 3.3.1

TABLE 3.5-2 (Sheet 2 of 3)

REACTOR TRIP INSTRUMENTATION LIMITING OPERATING CONDITIONS

No. FUNCTIONAL UNIT	1 NO. OF CHANNELS	2 NO. OF CHANNELS TO TRIP	3 MIN. NUMBER OF OPERABLE CHANNELS	4 MIN. DEGREE OF REDUNDANCY	5 OPERATOR ACTION IF CONDITIONS OF COL. 3 OR 4 CANNOT BE MET*
9. Lo Lo Steam Generator Water Level	3/loop	2/loop	2/loop	1/loop	Maintain hot shutdown
10. Undervoltage 6.9 KV Bus	1/bus	2	3	2	Maintain hot shutdown
11. Low Frequency 6.9 KV Bus**	1/bus	2	3	2	Maintain hot shutdown
12. Turbine Trip: Low auto stop oil pressure (Power ≥P-8)	3	2	2	1	Maintain reactor power below 50% of full power
13. Reactor Trip Breakers***	2	1	2	1	Maintain hot shutdown****
14. Reactor Protection Relay Logic	2	1	2	1	Maintain hot shutdown****

* Maintain hot shutdown means maintain or proceed to hot shutdown within 4 hours using normal operating procedures, if the unacceptable condition arises during operation.

** 2/4 trips all four reactor coolant pumps.

*** A reactor trip breaker is considered inoperable if any of its components fail to meet test specifications. If either the undervoltage or shunt trip device (not both) prevent a breaker from proper operation, then 72 hours are allowed to restore the failed device to operable status before the affected breaker is declared inoperable.

Amendment No. 26, 60, 74, 93, 192

ITS 3.3.1 (Rev 1)

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.3.1:
"Reactor Protection System (RPS) Instrumentation"

PART 3:

DISCUSSION OF CHANGES

Differences between CTS and ITS

DISCUSSION OF CHANGES
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

ADMINISTRATIVE

A.1 In the conversion of the Indian Point Unit 3 Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS) certain wording preferences or conventions are adopted which do not result in technical changes (either actual or interpretational). Additionally, editorial changes, reformatting, and revised numbering are adopted to make ITS consistent with the conventions in NUREG-1431, Standard Technical Specifications, Westinghouse Plants, Rev. 1, i.e., the improved Standard Technical Specifications.

The CTS Bases are deleted and replaced with comprehensive ITS Bases designed to support interpretation and implementation of the associated Technical Specifications. The Bases explain, clarify, and document the reasons (i.e., bases) for the associated Technical Specifications, and reflect the IP3 plant specific design, analyses, and licensing basis. In accordance with 10 CFR 50.36(a), the ITS Bases are included with the proposed ITS conversion application; however, deletion of the CTS Bases and the adoption of the ITS Bases is an administrative change with no impact on safety.

A.2 CTS Limiting Conditions for Operation (LCOs) and Surveillance Requirements (SRs) include statements of the objective and the applicability. The CTS statements of objective and applicability are deleted because these statements do not establish any requirements and do not provide any guidance for the application of CTS requirements. Therefore, deletion of these statements has no significant adverse impact on safety.

A.3 **ITS 3.3.1, Function 1, Manual Reactor Trip**, is equivalent to CTS Table 3.5-2, Function 1, Manual Reactor Yrip (sic). The ITS conversion modifies the CTS requirements as follows:

a. CTS 3.5 does not specify an Applicability for this Function but CTS Table 3.5-2 establishes an implied Applicability by requiring that the plant be in hot shutdown (Mode 3) if requirements cannot be met. ITS LCO 3.3.1 requires this function operable in Modes 1 and 2 and in Mode 3. 4 and 5 if the Rod Control System is capable of rod withdrawal or one or more rods are not fully inserted (ITS Table 3.3.1-1. Note a). This is a more restrictive change (see 3.3.1. DOC M.3).

b. CTS Table 3.5-2 requires 1 operable channel with a minimum degree of redundancy of zero. ITS 3.3.1 requires 2 operable channels. This is a more restrictive change (see 3.3.1. DOC M.2). In conjunction with this change. ITS LCO 3.3.1. Required Actions B.1. and C.1. will allow 48 hours to restore an inoperable channel when one of the two channels is inoperable (see 3.3.1. DOC M.3).

c. If requirements for minimum number of channels or minimum level of redundancy are not met (i.e., complete loss of manual reactor trip function). CTS Table 3.5-2 (footnote *) requires that the plant "maintain or proceed to hot shutdown within 4 hours using normal operating procedures." Under the same conditions (i.e., complete loss of manual trip capability). ITS LCO 3.3.1 defaults to ITS LCO 3.0.3 which requires that the plant be placed outside the Applicable Mode in less time than currently permitted by CTS Table 3.5-2 (footnote *). This is a more restrictive change (see 3.3.1. DOC M.5).

d. CTS Table 4.1-1. Item 39 (Remark 2) and Item 40 (Remark 2). require testing of the reactor trip and reactor trip bypass breakers every 24 months. ITS SR 3.3.1.14 maintains this requirement to perform a Trip Actuating Device Operational Test (TADOT) at a Frequency of 24 months. As specified in the Bases for ITS SR 3.3.1.14. this test verifies manual trip capability from the control room.

e. There is no allowable value or setpoint associated with this function.

Each of the changes described above is an administrative change with no adverse impact on safety except as noted with a cross reference to the associated description and justification.

A.4 **ITS 3.3.1, Function 2.a, Power Range Neutron Flux-High (trip)**. is equivalent to CTS 2.3.1.B(1) and CTS Table 3.5-2, Function 2, Nuclear Flux Power Range, except that the ITS provides distinct requirements for both Power Range Neutron Flux-High and Neutron-Flux Low. The ITS conversion modifies the CTS requirements for Power Range Neutron Flux-High as follows:

a. CTS 3.5 does not specify an Applicability for this Function but CTS Table 3.5-2 establishes an implied Applicability of Modes 1 and 2 by requiring that the plant be in hot shutdown (i.e., Mode 3) if requirements cannot be met. ITS requires this function operable in Modes 1 and 2. Therefore, there is no change to the existing Applicability requirement.

b. CTS Table 3.5-2 requires 3 operable channels with a minimum degree of redundancy of 2. This combination creates a requirement for 4 channels with no more than 1 channel in trip and enforces an unstated requirement that an inoperable channel be placed in trip (see ITS 3.3.1, DOC A.34). ITS requires 4 channels and associated Required Actions D.1 will also require that an inoperable channel be placed in trip. Therefore, there is no change to the existing requirements for minimum number of operable channels or minimum degree of redundancy except that the requirements are enforced by the combination of a requirement for a minimum number of channels and a specific requirement to place an inoperable channel in trip.

c. CTS 3.5.4 specifies that the requirements for minimum Operable channels and minimum degree of redundancy be maintained by placing an inoperable channel in trip. No Completion Time is specified but one hour to complete this task is a reasonable interpretation of the exiting requirement. Under the same conditions, ITS LCO 3.3.1, Required Action D.1 allow 6 hours to place the inoperable channel in trip. This is a less restrictive change justified in WCAP-10271-P-A, Supplement 2, Rev. 1, June 1990 (See ITS 3.3.1, DOC L.3).

If requirements for minimum number of channels or minimum level of redundancy are not met, CTS Table 3.5-2 (footnote *) requires that the plant "maintain or proceed to hot shutdown within 4 hours using normal operating procedures." IP3 interprets this requirement as reactor shutdown must commence within 4 hours and completed (i.e., Mode 3) within the following 4 to 6 hours. Under the same conditions, ITS LCO 3.3.1, Required Action D.2 (if there is a loss of redundancy), or ITS LCO 3.0.3 (if there is a loss of function), allow 6 or 7 hours, respectively, to be in Mode 3. This is a more restrictive change (See ITS 3.3.1, DOC M.5).

RAI-3

CTS 3.5.4 allows a channel to be bypassed for up to 8 hours for testing without taking Actions for an inoperable channel if Function trip capability is maintained. ITS LCO 3.3.1, Note to Required Actions for Condition D, maintains this allowance for surveillance testing and setpoint adjustment of other channels. The 8-hour bypass allowance of CTS 3.5.4 is being maintained in ITS based on CLB.

RAI-7

d. CTS Table 4.1-1, Item 1, requires a channel check every shift (12 hours); ITS SR 3.3.1.1 maintains this requirement at the same Frequency by requiring a channel check every 12 hours.

CTS Table 4.1-1, Item 1, requires a heat balance calibration daily; ITS SR 3.3.1.2 maintains this requirement for a heat balance calibration every 24 hours; however, ITS SR 3.3.1.2 includes the acceptance criteria that the NIS channel output must be adjusted if the difference between the NIS channel output and the calorimetric is > 2% RTP. Inclusion of this acceptance criteria in the ITS is an administrative change with no impact on safety because this acceptance criteria incorporate the current analysis assumptions and procedural requirements. Additionally, ITS SR 3.3.1.2 includes an allowance permitting this SR to be deferred until 24 hours after exceeding 15% RTP which is an explicit recognition that the SR cannot be performed until minimum plant conditions for performing the SR are established. This is an administrative change with no impact on safety because the allowance of 24 hours after exceeding 15% RTP is a reasonable interpretation of the existing requirement and is consistent with current practice.

CTS Table 4.1-1, Item 1, requires a channel test every quarter; ITS SR 3.3.1.7 maintains the requirement to perform a Channel Operation Test (COT) at a Frequency of 92 days.

CTS Table 4.1-1, Item 1, does not include an explicit requirement Channel Calibration of the Power Range Neutron Flux-High although the trip setpoints are verified as part of the quarterly operational test. ITS SR 3.3.1.11 is added to require a Channel Calibration of the Power Range Neutron Flux-High trip function every 24 months. This is a more restrictive change (See ITS 3.3.1, DOC M.7).

Information such as that found in CTS Table 4.1-1, Item 1, Note *., (incore moveable detectors used to perform this test), and information in the remarks column (details about what is included in the test) are relocated to the ITS Bases (see 3.3.1, DOC LA.2).

e. CTS 2.3.1.B(1) establishes the trip setpoint limiting safety system setting (allowable value) for the Power Range Neutron Flux-High at ≤ 109% RTP. This allowable value was established based on Indian Point Nuclear Generating Station Unit No. 3 Plant Manual Volume VI: Precautions, Limitations, and Setpoints, March 1975, and are considered conservative. ITS 3.3.1, Function 2.a, Power Range Neutron Flux-High, will maintain the CTS value as the allowable value.

Each of the changes described above is an administrative change with no adverse impact on safety except as noted with a cross reference to the associated justification.

A.5 **ITS 3.3.1, Function 2.b, Power Range Neutron Flux-Low (trip)**, is equivalent to CTS 2.3.1.A(1) and CTS Table 3.5-2, Function 2, Nuclear Flux Power Range except that the ITS provides distinct requirements for both Power Range Neutron Flux-High and Low. The ITS conversion modifies the CTS requirements for Power Range Neutron Flux-Low as follows:

a. CTS 3.5 does not specify an Applicability for this Function but CTS Table 3.5-2 establishes an implied Applicability by the existence of the P-10 interlock in the plant design as described in the FSAR and by requiring that the plant be in hot shutdown (Mode 3) if requirements cannot be met. ITS requires this function operable in Mode 1 (below the P-10 (Power Range Neutron Flux) interlock) and Mode 2. Therefore, there is no change to the existing Applicability requirement.

b. CTS Table 3.5-2 requires 3 operable channels with a minimum degree of redundancy of 2. This combination creates a requirement for 4 channels with no more than 1 channel in trip and enforces an unstated requirement that an inoperable channel be placed in trip (see ITS 3.3.1, DOC A.34). ITS requires 4 channels and associated Required Action E.1 will also require that an inoperable channel be placed in trip. Therefore, there is no change to the existing requirements for minimum number of operable channels or minimum degree of redundancy except that the requirements are enforced by the combination of a requirement for a minimum number of channels and a specific requirement to place an inoperable channel in trip.

c. CTS 3.5.4 specifies that the requirements for minimum Operable channels and minimum degree of redundancy be maintained by placing an inoperable channel in trip. No Completion Time is specified but one hour to complete this task is a reasonable interpretation of the exiting requirement. Under the same conditions, ITS LCO 3.3.1, Required Action E.1, allows 6 hours to place the inoperable channel in trip. This is a less restrictive change justified in WCAP-10271-P-A, Supplement 2, Rev. 1, June 1990 (See ITS 3.3.1, DOC L.3).

If requirements for minimum number of channels or minimum level of redundancy are not met, CTS Table 3.5-2 (footnote *) requires that the plant "maintain or proceed to hot shutdown within 4 hours using normal operating procedures." IP3 interprets this requirement as reactor shutdown must commence within 4 hours and completed (i.e., Mode 3) within the following 4 to 6 hours. Under the same conditions, ITS LCO 3.3.1, Required Action E.2 (if there is a loss of redundancy), or ITS LCO 3.0.3 (if there is a loss of function), allow 6 or 7 hours, respectively, to be in Mode 3. This is a more restrictive change (See ITS 3.3.1, DOC M.5).

CTS 3.5.4 allows a channel to be bypassed for up to 8 hours for testing without taking Actions for an inoperable channel if Function trip capability is maintained. ITS LCO 3.3.1, Note to Required Actions for Condition E, maintains this allowance for surveillance testing and setpoint adjustment of other channels. The 8-hour bypass allowance of CTS 3.5.4 is being maintained in ITS based on CLB.

RAI-7

d. CTS Table 4.1-1, Item 1, requires a channel check every shift (12 hours); ITS SR 3.3.1.1 maintains this requirement at the same Frequency by requiring a channel check every 12 hours.

CTS Table 4.1-1, Item 1, requires a channel test every quarter with associated Note ** to Table 4.1-1 requiring this test to be performed not less than 30 days prior to a reactor startup. ITS SR 3.3.1.8 maintains the requirement to perform a COT prior to reactor startup but only if the SR has not been performed in the previous 92 days. This is a less restrictive change (see 3.3.1, DOC L.4).

CTS Table 4.1-1, Item 1, requires a channel test every quarter with associated Note ** to Table 4.1-1 requiring this test to be performed when below the setpoint (i.e., P-10 setpoint). ITS SR 3.3.1.8 maintains the requirement to perform a COT quarterly when below the P-10 setpoint; however, the ITS SR 3.3.1.8 Frequency allows the SR to be deferred for 4 hours after power is reduced below P-10. This note is an explicit recognition that the SR cannot be performed until minimum plant conditions for performing the SR are established. This is an administrative change with no impact on safety because allowing 4 hours after plant conditions are established is a reasonable interpretation of the existing Note ** to Table 4.1-1 which requires that the SR be performed quarterly when below the P-10 setpoint.

RAI 3.3.1-10

CTS Table 4.1-1, Item 1, does not include an explicit requirement Channel Calibration of the Power Range Neutron Flux-Low although the trip setpoints are verified as part of the quarterly operational test. ITS SR 3.3.1.11 is added to require a Channel Calibration of the Power Range Neutron Flux-Low trip function every 24 months. This is a more restrictive change (See ITS 3.3.1, DOC M.7).

Information such as that found in CTS Table 4.1-1, Item 1, Note *, (incore moveable detectors used to perform this test), and information in the remarks column (details about what is included in the test) are relocated to the ITS Bases (see 3.3.1, DOC LA.2).

e. CTS 2.3.1.A(1) establishes the trip setpoint limiting safety system setting (allowable value) for the Power Range Neutron Flux-Low at ≤ 25% RTP. This allowable value was established based on Indian Point Nuclear Generating Station Unit No. 3 Plant Manual Volume VI: Precautions, Limitations, and Setpoints, March 1975, and are considered conservative. ITS 3.3.1, Function 2.b, Power Range Neutron Flux-Low, will maintain the CTS value as the allowable value.

Each of the changes described above is an administrative change with no adverse impact on safety except as noted with a cross reference to the associated justification.

A.6 **ITS 3.3.1, Function 3, Intermediate Range Neutron Flux (trip)**, is not identified as a safety limit or limiting condition of operation in the CTS because IRM trip Function is assumed to be a backup to Power Range Neutron Flux-Low trip in the transient and accident analysis (FSAR Section 14).

a. ITS 3.3.1, Function 3, IRM Flux (trip), is required to be Operable in Mode 1 below the P-10 setpoint, and in MODE 2, when there is a potential for an uncontrolled RCCA bank rod withdrawal accident during reactor startup. Above the P-10 setpoint, the Power Range Neutron Flux – High Setpoint trip provides core protection for a rod withdrawal accident. In MODE 3, 4, or 5, the Intermediate Range Neutron Flux trip does not have to be OPERABLE because the control rods must be fully inserted and only the shutdown rods may be withdrawn (except during rod testing).

b. ITS 3.3.1, Function 3, will require one channel of the IRM trip function. This requirement is added to the ITS because it provides redundant protection to the Power Range Neutron Flux – Low Setpoint trip Function for an uncontrolled RCCA bank rod withdrawal accident from a subcritical condition during startup.(see 3.3.1, DOC M.1). Additionally, the control room indication implicit in the requirement for this Function provides the monitoring requirements currently established in CTS 3.5.6 (see ITS 3.3.1, DOC M.1).

c. In conjunction with this change, ITS LCO 3.3.1, Required Actions

F.1 and F.2, are added to require suspending operations involving positive reactivity addition immediately and reducing power to outside the Applicable Mode within 2 hours if the one required channel of Intermediate Range Neutron Flux (trip) is not Operable.

d. CTS Table 4.1-1, Item 2, requires a channel check of the IRM output every shift; ITS SR 3.3.1.1 maintains this requirement at the same Frequency by requiring a channel check every 12 hours.

CTS Table 4.1-1, Item 2 (Frequency P(2)), requires that IRM response to a simulated signal (i.e., Channel Operational Test) be performed "prior to each startup if not performed in the previous week." ITS SR 3.3.1.8 maintains the requirement to perform a COT; however, the Frequency is extended to 92 days (See ITS 3.3.1, DOC L.4).

CTS Table 4.1-1, Item 2, does not include an explicit requirement to perform a COT of the IRM Flux (trip) during a reactor shutdown. This is an implicit assumption that the reactor shutdown will always be completed and the plant will not spend a significant amount of time in the Applicable Mode for this function. ITS SR 3.3.1.8 includes a new requirement to perform a COT for ITS 3.3.1, Function 3, within 12 hours after reducing power below the P-10 setpoint (See ITS 3.3.1, DOC M.4). This ensures that the COT will verify function Operability if the plant expects to stay critical, while allowing this SR to be skipped if the reactor shutdown will be completed promptly.

RAI-10

CTS Table 4.1-1, Item 2, does not include an explicit requirement Channel Calibration of the IRM Flux (trip) although the trip setpoints are verified as part of the operational test. ITS SR 3.3.1.11 is added to require a Channel Calibration of the Intermediate Range Neutron Flux trip function every 24 months. This is a more restrictive change (See ITS 3.3.1, DOC M.7).

e. CTS 2.3 does not establish a limiting safety system setting (allowable value) for the IRM Flux (trip) function although the CTS Bases indicate that the setpoint is equivalent to approximately 25% RTP. Table 3.3.1-1 identifies the Technical Specification Allowable Value for this trip function as not applicable (NA) because the LCO 3.3.1, Function 2.b, Power Range Neutron Flux-Low, is used to bound the analysis for an uncontrolled control rod assembly withdrawal from a subcritical condition. The allowable value required for OPERABILITY of this trip function will be maintained in the ITS Bases and is maintained at 25% RTP. This allowable value was established based on Indian Point Nuclear Generating Station Unit No. 3 Plant Manual Volume VI: Precautions, Limitations, and Setpoints, March 1975.

Each of the changes described above is an administrative change with no adverse impact on safety except as noted with a cross reference to the associated description and justification.

A.7 **ITS 3.3.1, Function 4, Source Range Neutron (SRM) Flux (trip)**, is not identified as a safety limit or limiting condition of operation in the CTS because SRM trip Function is assumed to be a backup to Power Range Neutron Flux-Low trip in the transient and accident analysis (FSAR Section 14).

a. ITS 3.3.1, Function 4, SRM Flux (trip), is required to be Operable in Mode 2 below the P-6 (IRM interlock) setpoint, and in Modes 3, 4 and 5 when the rod control system is capable of rod withdrawal or any rod is not fully inserted. The NIS source range detectors do not provide any inputs to control systems. The source range trip is the only RPS automatic protection function required in MODES 3, 4, and 5. Therefore, the functional capability at the specified Trip Setpoint is assumed to be available.

b. ITS 3.3.1, Function 4, SRM Flux (trip), will require one channel of the SRM trip function. This requirement is added to the ITS because it provides redundant protection to the Power Range Neutron Flux-Low Setpoint trip Function for an uncontrolled RCCA bank rod withdrawal accident from a subcritical condition during startup.(see 3.3.1, DOC M.1). One channel is acceptable because administrative controls also prevent the uncontrolled withdrawal of rods.

C. In conjunction with this change, ITS LCO 3.3.1, Required Action G.1, is added to require opening the Reactor Trip Breakers (RTBs) immediately if the one required channel of SRM Neutron Flux (trip) is not Operable. This Action places the plant outside the Applicable Mode.

d. CTS Table 4.1-1. Item 3. requires a channel check of the SRM output every shift; ITS SR 3.3.1.1 maintains this requirement at the same Frequency by requiring a channel check every 12 hours.

CTS Table 4.1-1. Item 3 (Frequency P(2)). requires that SRM response to a simulated signal (i.e.. Channel Operational Test) be performed "prior to each startup if not performed in the previous week." ITS SR 3.3.1.8 maintains the requirement to perform a COT; however. the Frequency is extended to 92 days (See ITS 3.3.1. DOC L.4).

CTS Table 4.1-1. Item 3. does not include an explicit requirement to perform a COT of the SRM Flux (trip) during a reactor shutdown. This is an implicit assumption that the reactor shutdown will always be completed and the plant will not spend a significant amount of time in the Applicable Mode for this function.

i. When in Mode 2. ITS SR 3.3.1.8 establishes a new requirement to perform a COT for ITS 3.3.1. Function 4. within 4 hours after reducing power below the P-6 (IRM Flux interlock) setpoint. This ensures that the COT will verify function Operability if the plant expects to stay critical. while allowing this SR to be skipped if the reactor shutdown will be completed promptly (See ITS 3.3.1. DOC M.4).

ii. When in Modes 3. 4 or 5 with CRD system capable of rod withdrawal and one or more rods not fully inserted. ITS SR 3.3.1.7 establishes a new requirement to perform a COT for ITS 3.3.1. Function 4. within 4 hours after entering Mode 3 from Mode 2 and every 92 days thereafter. This change is needed because the source range trip is the only RPS automatic protection function required in MODES 3. 4. and 5 (See ITS 3.3.1. DOC M.4).

CTS Table 4.1-1. Item 3. does not include an explicit requirement Channel Calibration of the SRM Flux (trip) although the trip setpoints are verified as part of the operational test. ITS SR 3.3.1.11 is added to require a Channel Calibration of the Source Range Neutron Flux trip function every 24 months. This is a more restrictive change (See ITS 3.3.1, DOC M.7).

e. CTS 2.3 does not establish a limiting safety system setting (allowable value) for the SRM Flux (trip) function although the CTS Bases indicate that the setpoint is equivalent to approximately 1.0 E+5 counts per second.

Table 3.3.1-1 identifies the Technical Specification Allowable Value for this trip function as not applicable (NA) because the LCO 3.3.1, Function 2.b, Power Range Neutron Flux-Low, is used to bound the analysis for an uncontrolled control rod assembly withdrawal from a subcritical condition. The allowable value required for OPERABILITY of this trip function is maintained in the ITS Bases and is maintained at 1.0 E+5 counts per second. This allowable value was established based on Indian Point Nuclear Generating Station Unit No. 3 Plant Manual Volume VI: Precautions, Limitations, and Setpoints, March 1975, (Ref. 8).

A.8 **ITS 3.3.1, Function 5, Overtemperature delta** T, is equivalent to CTS 2.3.1.B(4) and CTS Table 3.5-2, Function 3, Overtemperature delta T. The ITS conversion modifies the CTS requirements for Overtemperature delta T as follows:

a. CTS 3.5 does not specify an Applicability for this Function but CTS Table 3.5-2 establishes an implied Applicability of Modes 1 and 2 by requiring that the plant be in hot shutdown (i.e., Mode 3) if requirements cannot be met. ITS requires this function operable in Modes 1 and 2. Therefore, there is no change to the existing Applicability requirement.

b. CTS Table 3.5-2 requires 3 operable channels with a minimum degree of redundancy of 2. This combination creates a requirement for 4 channels with no more than 1 channel in trip and enforces an unstated requirement that an inoperable channel be placed in trip (see ITS 3.3.1, DOC A.34). ITS requires 4 channels and associated Required Action E.1 will also require that an inoperable channel be placed in trip. Therefore, there is no change to the existing requirements for minimum number of operable channels or minimum degree of redundancy except that the requirements are enforced by the combination of a requirement for a minimum number of channels and a specific requirement to place an inoperable channel in trip.

c. CTS 3.5.4 specifies that the requirements for minimum Operable channels and minimum degree of redundancy be maintained by placing an inoperable channel in trip. No Completion Time is specified but one hour to complete this task is a reasonable interpretation of the exiting requirement. Under the same conditions, ITS LCO 3.3.1, Required Action E.1, allows 6 hours to place the inoperable channel in trip. This is a less restrictive change justified in WCAP-10271-P-A, Supplement 2, Rev. 1, June 1990 (See ITS 3.3.1, DOC L.3).

If requirements for minimum number of channels or minimum level of redundancy are not met, CTS Table 3.5-2 (footnote *) requires that the plant "maintain or proceed to hot shutdown within 4 hours using normal operating procedures." IP3 interprets this requirement as reactor shutdown must commence within 4 hours and completed (i.e., Mode 3) within the following 4 to 6 hours. Under the same conditions, ITS LCO 3.3.1, Required Action E.2 (if there is a loss of redundancy), or ITS LCO 3.0.3 (if there is a loss of function), allow 6 or 7 hours, respectively, to be in Mode 3. This is a more restrictive change (See ITS 3.3.1, DOC M.5).

CTS 3.5.4 allows a channel to be bypassed for up to 8 hours for testing without taking Actions for an inoperable channel if Function trip capability is maintained. ITS LCO 3.3.1, Note to Required Actions for Condition E, maintains this allowance for surveillance testing and setpoint adjustment of other channels. The 8-hour bypass allowance of CTS 3.5.4 is being maintained in ITS based on CLB.

RAI-7

d. CTS Table 4.1-1, Item 1 (Remark 4), Item 4, and Item 7, require channel checks every shift of the inputs to Overtemperature delta T (i.e., Nuclear Power Range, RCS Temperature, and RCS Pressure); ITS SR 3.3.1.1 maintains this requirement at the same Frequency by an inoperable channel in trip. No Completion Time is specified but one hour to complete this task is a reasonable interpretation of the exiting requirement. Under the same conditions, ITS LCO 3.3.1, Required Action H.1, allows 6 hours to place the inoperable channel in trip. This is a less restrictive change justified in WCAP-10271-P-A, Supplement 2, Rev. 1, June 1990 (See ITS 3.3.1, DOC L.3).

If requirements for minimum number of channels or minimum level of redundancy are not met, CTS Table 3.5-2 (footnote *) requires that the plant "maintain or proceed to hot shutdown within 4 hours using normal operating procedures." IP3 interprets this requirement as reactor shutdown must commence within 4 hours and completed (i.e., Mode 3) within the following 4 to 6 hours.

Under the same conditions, ITS LCO 3.3.1, Required Action H.2 (if there is a loss of redundancy), or ITS LCO 3.0.3 (if there is a loss of function), allow 6 or 7 hours, respectively, to reduce power less < P-7 setpoint (i.e., place the plant outside the Applicability for the Function). The requirement to place the plant outside of the Applicable Mode versus Mode 3 is an administrative change because it is a reasonable interpretation of the equivalent CTS requirement. The reduction in the Completion Time (elimination of the 4 hour delay until shutdown is started) is a more restrictive change (See ITS 3.3.1, DOC M.5).

CTS 3.5.4 allows a channel to be bypassed for up to 8 hours for testing without taking Actions for an inoperable channel if Function trip capability is maintained. ITS LCO 3.3.1, Note to Required Actions for Condition H, maintains this allowance for surveillance testing and setpoint adjustment of other channels. The 8-hour bypass allowance of CTS 3.5.4 is being maintained in ITS based on CLB.

RAI-7

d. CTS Table 4.1-1, Item 7, requires a channel check every shift; ITS SR 3.3.1.1 maintains this requirement at the same Frequency by requiring a channel check every 12 hours.

CTS Table 4.1-1, Item 7, requires a channel test every quarter; ITS SR 3.3.1.7 maintains the requirement to perform a Channel

Operation Test (COT) at a Frequency of 92 days.

CTS Table 4.1-1, Item 7, requires a channel calibration every 24 months; ITS SR 3.3.1.10 maintains the requirement to perform a Channel Calibration at a Frequency of 24 months.

e. CTS 2.3.1.B(3) establishes the trip setpoint limiting safety system setting (allowable value) for the for the Pressurizer Pressure-Low at ≥1800 psig. This LSSS is based on the Indian Point Nuclear Generating Station Unit No. 3 Plant Manual, Volume VI: Precautions, Limitations, and Setpoints, March 1975. ITS 3.3.1, Function 7.a, Pressurizer Pressure-Low, establishes the allowable value at ≥ 1749 psig because ITS uses allowable values calculated in accordance with Engineering Standards Manual IES-3 and IES 3-B, Instrument Loop Accuracy and Setpoint Calculation Methodology (IP3) (See ITS 3.3.1, DOC L.1).

Each of the changes described above is an administrative change with no adverse impact on safety except as noted with a cross reference to the associated description and justification.

A.11 **ITS 3.3.1, Function 7.b, Pressurizer Pressure-High**, is equivalent to CTS 2.3.1.B(2) and CTS Table 3.5-2, Function 6, Hi Pressurizer Pressure. The ITS conversion modifies the CTS requirements for Pressurizer Pressure-High as follows:

a. CTS 3.5 does not specify an Applicability for this Function but CTS Table 3.5-2 establishes an implied Applicability of Modes 1 and 2 by requiring that the plant be in hot shutdown (i.e., Mode 3) if requirements cannot be met. ITS requires this function operable in Modes 1 and 2. Therefore, there is no change to the existing Applicability requirement.

b. CTS Table 3.5-2 requires 2 operable channels with a minimum degree of redundancy of 1. This combination creates a requirement for 3 channels with no more than 1 channel in trip and enforces an unstated requirement that an inoperable channel be placed in trip (see 3.3.1, DOC A.34). ITS requires 3 channels and associated Required Action E.1 will also require that an inoperable channel be placed in trip. Therefore, there is no change to the existing requirements for minimum number of operable channels or minimum degree of redundancy except that the requirements are enforced by the combination of a requirement for a minimum number of channels and a specific requirement to place an inoperable channel in trip.

c. CTS 3.5.4 specifies that the requirements for minimum Operable channels and minimum degree of redundancy be maintained by placing an inoperable channel in trip. No Completion Time is specified but one hour to complete this task is a reasonable interpretation of the exiting requirement. Under the same conditions, ITS LCO 3.3.1, Required Action E.1, allows 6 hours to place the inoperable channel in trip. This is a less restrictive change justified in WCAP-10271-P-A, Supplement 2, Rev. 1, June 1990 (See ITS 3.3.1, DOC L.3).

If requirements for minimum number of channels or minimum level of redundancy are not met, CTS Table 3.5-2 (footnote *) requires that the plant "maintain or proceed to hot shutdown within 4 hours using normal operating procedures." IP3 interprets this requirement as reactor shutdown must commence within 4 hours and completed (i.e., Mode 3) within the following 4 to 6 hours. Under the same conditions, ITS LCO 3.3.1, Required Action E.2 (if there is a loss of redundancy), or ITS LCO 3.0.3 (if there is a loss of function), allow 6 or 7 hours, respectively, to be in Mode 3. This is a more restrictive change (See ITS 3.3.1, DOC M.5).

CTS 3.5.4 allows a channel to be bypassed for up to 8 hours for testing without taking Actions for an inoperable channel if Function trip capability is maintained. ITS LCO 3.3.1, Note to Required Actions for Condition E, maintains this allowance for surveillance testing and setpoint adjustment of other channels. The 8-hour bypass allowance of CTS 3.5.4 is being maintained in ITS based on CLB.

RAI-7

d. Changes to Surveillance requirements CTS Table 4.1-1, Item 7, Pressurizer Pressure, for ITS 3.3.1, Function 7.b, Pressurizer Pressure-High, are identical to the changes to CTS Table 4.1-1, Item 7, for ITS 3.3.1, Function 7.a, Pressurizer Pressure-Low.

A.13 **ITS 3.3.1, Function 9, Reactor Coolant Flow-Low (trip) (One Loop),** replaces the following two CTS Functions:

a. CTS Table 3.5-2, Function 8(a), Low Flow One Loop (Power ≥ P-8); and,

b. CTS Table 3.5-2, Function 8(b), Low Flow Two Loops (Power < P-8 and ≥ P-10[1]).

The ITS specifies that there is one Reactor Coolant Flow-Low trip and that this trip function is modified by plant conditions as follows:

a. Trip occurs on loss of flow in one loop if ≥ P-8 (i.e., 50% RTP);

b. Trip does not occur until there is a loss of flow in two loops if RTP is < P-8; and,

c. Trip does not occur on a loss of flow if < P-7 (CTS P-10) (i.e., 10% RTP).

The ITS conversion modifies the CTS requirements for Reactor Coolant Flow-Low-One Loop as follows:

a. As Specified in CTS 2.3.2.B, CTS Table 3.5-2, Function 8(a), Low Flow One Loop, must be Operable when > 50% RTP (above the P-8 interlock setpoint) because a reactor trip on loss of flow in one loop is required only if > 50% RTP. ITS 3.3.1, Function 9, which includes both the one loop and two loop Reactor Coolant Flow-Low trip is required to be Operable whenever either the one loop or two loop trip is required (i.e., above the P-7 interlock setpoint). This Applicability is maintained by ITS Table 3.3.1-1, Note (e). ITS 3.3.1, Function 17.c, Power Range Flux, P-8, maintains the allowance that the reactor trip on loss of flow in one loop may be bypassed when < 50% RTP (See ITS 3.3.1, DOC A.28). Therefore, there is no change to the CTS Applicability for CTS Table 3.5-2, Function 8(a), Low Flow One Loop.

b. CTS Table 3.5-2, Functions 8 and 9, require 2 operable channels per loop with a minimum degree of redundancy of 1 operable channel per loop. This combination creates a requirement for 3 channels per loop with no more than 1 channel per loop in trip and enforces

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[1] Note: CTS Table 3.5-2, Function 8(b), Low Flow Two Loops (Power < P-8 and ≥ P-10) should read (Power < P-8 and ≥ P-7) as shown in Dwg 113E301, Sheet 9, Rev 8.

an unstated requirement that an inoperable channel be placed in trip (see 3.3.1, DOC A.34). ITS LCO 3.3.1, Function 9, requires 3 channels per loop and associated Required Action H.1 requires that an inoperable channel be placed in trip. Therefore, there is no change to the existing requirements for minimum number of operable channels or minimum degree of redundancy except that the requirements are enforced by the combination of a requirement for a minimum number of channels and a specific requirement to place an inoperable channel in trip.

c. If requirements for minimum number of channels or minimum level of redundancy are not met, CTS Table 3.5-2 (footnote *) requires that the plant "maintain or proceed to hot shutdown within 4 hours using normal operating procedures." IP3 interprets this requirement as reactor shutdown must commence within 4 hours and completed (i.e., Mode 3) within the following 4 to 6 hours.

   Under the same conditions, ITS LCO 3.3.1, Required Action H.2 (if there is a loss of redundancy), or ITS LCO 3.0.3 (if there is a loss of function), allow 6 or 7 hours, respectively, to reduce power less < P-7 setpoint (i.e., place the plant outside the Applicability for the Function). The requirement to place the plant outside of the Applicable Mode versus Mode 3 is an administrative change because it is a reasonable interpretation of the equivalent CTS requirement. The reduction in the Completion Time (elimination of the 4 hour delay until shutdown is started) is a more restrictive change (See ITS 3.3.1, DOC M.5).

   CTS 3.5.4 allows a channel to be bypassed for up to 8 hours for testing without taking Actions for an inoperable channel if Function trip capability is maintained. ITS LCO 3.3.1, Note to Required Actions for Condition H, maintains this allowance for surveillance testing and setpoint adjustment of other channels. The 8-hour bypass allowance of CTS 3.5.4 is being maintained in ITS based on CLB.

RAI-2

d. CTS Table 4.1-1, Item 5, Reactor Coolant Flow, requires a channel check every shift; ITS SR 3.3.1.1 maintains this requirement at the same Frequency by requiring a channel check every 12 hours.

CTS Table 4.1-1, Item 5, requires a channel test every quarter; ITS SR 3.3.1.7 maintains the requirement to perform a Channel Operation Test (COT) at a Frequency of 92 days.

CTS Table 4.1-1, Item 5, requires a channel calibration every 24 months; ITS SR 3.3.1.10 maintains the requirement to perform a Channel Calibration at a Frequency of 24 months.

e. CTS 2.3.1.B(6)(a) establishes the trip setpoint limiting safety system setting (allowable value) for the for the Reactor Coolant Flow-Low trip (both one loop and two loops) at ≥ 90% of normal indicated loop flow. This LSSS is based on the Indian Point Nuclear Generating Station Unit No. 3 Plant Manual, Volume VI: Precautions, Limitations, and Setpoints, March 1975. ITS 3.3.1, Function 9, Reactor Coolant Flow-Low (trip), establishes the allowable value at ≥ 89% of normal indicated loop flow because ITS uses allowable values calculated in accordance with Engineering Standards Manual IES-3 and IES 3-B, Instrument Loop Accuracy and Setpoint Calculation Methodology (IP3) (See ITS 3.3.1, DOC L.1).

Each of the changes described above is an administrative change with no adverse impact on safety except as noted with a cross reference to the associated description and justification.

A.14 **ITS 3.3.1, Function 9, Reactor Coolant Flow-Low (trip) (two loop),** replaces the following two CTS Functions:

a. CTS Table 3.5-2, Function 8(a), Low Flow One Loop (Power ≥ P-8); and,
b. CTS Table 3.5-2, Function 8(b), Low Flow Two Loops (Power < P-8 and ≥ P-10[2]).

The ITS specifies that there is one Reactor Coolant Flow-Low trip and that this trip function is modified by plant conditions as follows:

a. Trip occurs on loss of flow in one loop if ≥ P-8 (i.e., 50% RTP);
b. Trip does not occur until there is a loss of flow in two loops if

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[2] Note: CTS Table 3.5-2, Function 8(b), Low Flow Two Loops (Power < P-8 and ≥ P-10) should read (Power < P-8 and ≥ P-7) as shown on Dwg. 113E301, Rev 9.)

Function 10.b. RCP Breaker Position. Two Loop: (DOC A.16)
Two open RCP breakers are required to cause a reactor trip if the plant is above P-7 interlock (>10% RTP)

Function 12. Underfrequency RCPs: (DOC A.18)
Underfrequency on two or more 6.9 kV buses is required to cause all four RCP breakers to open.

The ITS conversion establishes **ITS 3.3.1. Function 10.a. Reactor Coolant Pump (RCP) Breaker Position-Single Loop**, based on CTS 2.3.1.B.6(b) and CTS Table 3.5-2. Item 11. 6.9 kV bus Underfrequency trip function. when above P-8 interlock (>50% RTP) as follows:

a. CTS 2.3.2.B indirectly specifies that this Function may be bypassed when ≤ 50% of rated power (P-8 interlock setpoint) (i.e.. loss of flow in a single loop will not result in a trip when ≤ 50% of rated power) because this Function is an anticipatory trip for the loss of coolant flow function. This is also consistent with the Applicability of CTS Table 3.5-2. Item 8. Low Flow-One Loop. which the RCP breaker trip function is intended to anticipate. ITS requires this function operable in Mode 1 and associated Note (f) specifies that this Function is required only when above the P-8 (Power Range Neutron Flux) interlock. Therefore. there is no change to the Applicability of this Function.

b. CTS Table 3.5-2 requires 3 operable channels with a minimum degree of redundancy of 2. This combination creates a requirement for 4 channels (1 channel per RCP breaker) and requires that an inoperable channel be restored to Operable rather than placed in trip (see 3.3.1. DOC A.34) because placing an inoperable channel in trip would cause a RCP trip and a reactor trip. Therefore. ITS 3.3.1. Function 10.a. restates the requirement for minimum operable channels as "1 per RCP" and associated Required Action I.1 requires that an inoperable channel be restored to Operable (see 3.3.1. DOC A.34) within 6 hours (see 3.3.1. DOC L.3). Therefore. there is no change to the existing requirements for minimum number of operable channels or minimum degree of redundancy except these requirements are enforced by the combination of a requirement for a minimum number of channels and a specific requirement to restore an inoperable channel to

Operable status (versus placing it in trip which would cause a reactor trip).

c. CTS 3.5.4 specifies that the requirements for minimum Operable channels and minimum degree of redundancy be maintained by placing an inoperable channel in trip or, in this chase, restoring the channel to Operable. No Completion Time is specified but one hour to complete this task is a reasonable interpretation of the exiting requirement. Under the same conditions, ITS LCO 3.3.1, Required Action I.1, allows 6 hours to restore an inoperable channel. This is a less restrictive change justified in WCAP-10271-P-A, Supplement 2, Rev. 1, June 1990 (See ITS 3.3.1, DOC L.3).

If requirements for minimum number of channels or minimum level of redundancy are not met, CTS Table 3.5-2 (footnote *) requires that the plant "maintain or proceed to hot shutdown within 4 hours using normal operating procedures." IP3 interprets this requirement as reactor shutdown must commence within 4 hours and completed (i.e., Mode 3) within the following 4 to 6 hours. Under the same conditions, ITS LCO 3.3.1, Required Action I.2 (if there is a loss of redundancy), or ITS LCO 3.0.3 (if there is a loss of function), allow 6 or 7 hours, respectively, to be in Mode 3. This is a more restrictive change (See ITS 3.3.1, DOC M.5).

CTS 3.5.4 allows a channel to be bypassed for up to 8 hours for testing without taking Actions for an inoperable channel if Function trip capability is maintained. ITS LCO 3.3.1, Note to Required Actions for Condition D, maintains this allowance for surveillance testing and setpoint adjustment of other channels. The 8-hour bypass allowance of CTS 3.5.4 is being maintained in ITS based on CLB.

RAI-2

d. CTS Table 4.1-1, Item 8, (as it relates to the RCP Breaker position portion of the 6.9 kV Underfrequency Function), requires a channel calibration every 24 months. This is interpreted to require verification that a reactor trip results when any RCP breaker is opened when the P-8 interlock is not set to bypass this function. ITS SR 3.3.1.13 maintains the requirement to perform a Trip Actuating Device Operational Test (TADOT) at a Frequency of

24 months. ITS SR 3.3.1.14 is modified by a Note that provides an exception to the definition of a TADOT that is needed because RCP Breaker position does not have a setpoint (other than opened or closed).

e. There is no allowable value or setpoint associated with this function.

Each of the changes described above is an administrative change with no adverse impact on safety except as noted with a cross reference to the associated description and justification.

A.16 **ITS 3.3.1, Function 10,b, Reactor Coolant Pump (RCP) Breaker Position-Two Loops**, is derived from CTS 2.3.1.B.6(b) and CTS Table 3.5-2, Item 11, 6.9 kV bus Underfrequency (see ITS 3.3.1, DOC A.15).

The ITS conversion establishes **ITS 3.3.1, Function 10.b, Reactor Coolant Pump (RCP) Breaker Position-Two Loop**, based on CTS 2.3.1.B.6(b) and CTS Table 3.5-2, Item 11, 6.9 kV bus Underfrequency trip function, as follows:

a. CTS 2.3.2.A indirectly specifies that this Function may be bypassed when ≤ 10% of rated power (P-7 interlock setpoint) (i.e., loss of flow in two loops will not result in a trip when ≤ 10% of rated power) because this Function is an anticipatory trip for the loss of coolant flow function. This is also consistent with the Applicability of CTS Table 3.5-2, Item 8, Low Flow-Two Loops, which the RCP breaker trip function is intended to anticipate. ITS requires this function operable in Mode 1 and associated Note (g) specifies that this Function is required only when above the P-7 (Low Power Reactor Trip Block) interlock. Additionally, Note (g) specifies that this Function is not required when above the P-8 setpoint. This is acceptable because ITS 3.3.1, Function 10,a, provides the anticipatory trip for loss of flow when above P-8 setpoint. Therefore, there is no change to the Applicability of this Function.

b. Changes to requirements for minimum number of Operable channels for ITS 3.3.1, Function 10.b, Reactor Coolant Pump (RCP) Breaker

Position-Two Loop, based on CTS 2.3.1.B.6(b) and CTS Table 3.5-2, Item 11, 6.9 kV bus Underfrequency trip function, are described in DOC 15.b.

c. CTS 3.5.4 specifies that the requirements for minimum Operable channels and minimum degree of redundancy be maintained by placing an inoperable channel in trip. No Completion Time is specified but one hour to complete this task is a reasonable interpretation of the exiting requirement. Under the same conditions, ITS LCO 3.3.1, Required Action H.1, allows 6 hours to place the inoperable channel in trip. This is a less restrictive change justified in WCAP-10271-P-A, Supplement 2, Rev. 1, June 1990 (See ITS 3.3.1, DOC L.3).

If requirements for minimum number of channels or minimum level of redundancy are not met, CTS Table 3.5-2 (footnote *) requires that the plant "maintain or proceed to hot shutdown within 4 hours using normal operating procedures." IP3 interprets this requirement as reactor shutdown must commence within 4 hours and completed (i.e., Mode 3) within the following 4 to 6 hours.

Under the same conditions, ITS LCO 3.3.1, Required Action H.2 (if there is a loss of redundancy), or ITS LCO 3.0.3 (if there is a loss of function), allow 6 or 7 hours, respectively, to reduce power less < P-7 setpoint (i.e., place the plant outside the Applicability for the Function). The requirement to place the plant outside of the Applicable Mode versus Mode 3 is an administrative change because it is a reasonable interpretation of the equivalent CTS requirement. The reduction in the Completion Time (elimination of the 4 hour delay until shutdown is started) is a more restrictive change (See ITS 3.3.1, DOC M.5).

CTS 3.5.4 allows a channel to be bypassed for up to 8 hours for testing without taking Actions for an inoperable channel if Function trip capability is maintained. ITS LCO 3.3.1, Note to Required Actions for Condition H, maintains this allowance for surveillance testing and setpoint adjustment of other channels. The 8-hour bypass allowance of CTS 3.5.4 is being maintained in ITS based on CLB.

RAI-7

d. Changes to Surveillance requirements CTS Table 4.1-1, Item 8, (as it relates to the RCP Breaker position portion of the 6.9 kV Underfrequency Function) for **ITS 3.3.1, Function 10.b, Reactor Coolant Pump (RCP) Breaker Position-Two Loop**, are discussed in DOC A.15.d.

e. There is no allowable value or setpoint associated with this function.

Each of the changes described above is an administrative change with no adverse impact on safety except as noted with a cross reference to the associated description and justification.

A.17 **ITS 3.3.1, Function 11, Undervoltage RCPs (6.9 kV bus)**, is equivalent to CTS 2.3.1.B(7) and CTS Table 3.5-2, Function 10, Undervoltage 6.9 kV Bus. The ITS conversion modifies the CTS requirements for Undervoltage RCPs (6.9 kV bus) as follows:

a. CTS 2.3.2.A indirectly specifies that this Function may be bypassed when ≤ 10% of rated power (P-7 interlock setpoint) (i.e., loss of flow in two loops will not result in a trip when ≤ 10% of rated power) because this Function is an anticipatory trip for the loss of coolant flow function. This is also consistent with the Applicability of CTS Table 3.5-2, Item 8, Low Flow (both one Loop and two loops), which the undervoltage trip function is intended to anticipate. ITS requires this function operable in Mode 1 and associated Note (e) specifies that this Function is required only when above the P-7 (Low Power Reactor Trip Block) interlock. Therefore, there is no change to the Applicability of this Function.

b. CTS Table 3.5-2 requires 3 operable channels with a minimum degree of redundancy of 2. This combination creates a requirement for 4 channels (1 channel per RCP bus) and requires that an inoperable channel be placed in trip. Therefore, ITS 3.3.1, Function 11, restates the requirement for minimum operable channels as "1 per bus" (i.e., 4 operable channels) and associated Required Action H.1 requires that an inoperable channel be placed in trip. Therefore, there is no change to the existing requirements for minimum number of operable channels or minimum degree of redundancy except that the requirements are enforced by the combination of a requirement for a minimum number of channels and a specific requirement to place an inoperable channel in trip.

c. CTS 3.5.4 specifies that the requirements for minimum Operable channels and minimum degree of redundancy be maintained by placing an inoperable channel in trip. No Completion Time is specified but one hour to complete this task is a reasonable interpretation of the exiting requirement. Under the same conditions, ITS LCO 3.3.1, Required Action H.1, allows 6 hours to place the inoperable channel in trip. This is a less restrictive change justified in WCAP-10271-P-A, Supplement 2, Rev. 1, June 1990 (See ITS 3.3.1, DOC L.3).

If requirements for minimum number of channels or minimum level of redundancy are not met, CTS Table 3.5-2 (footnote *) requires that the plant "maintain or proceed to hot shutdown within 4 hours using normal operating procedures." IP3 interprets this requirement as reactor shutdown must commence within 4 hours and completed (i.e., Mode 3) within the following 4 to 6 hours.

Under the same conditions, ITS LCO 3.3.1, Required Action H.2 (if there is a loss of redundancy), or ITS LCO 3.0.3 (if there is a loss of function), allow 6 or 7 hours, respectively, to reduce power less < P-7 setpoint (i.e., place the plant outside the Applicability for the Function). The requirement to place the plant outside of the Applicable Mode versus Mode 3 is an administrative change because it is a reasonable interpretation of the equivalent CTS requirement. The reduction in the Completion Time (elimination of the 4 hour delay until shutdown is started) is a more restrictive change (See ITS 3.3.1, DOC M.5).

CTS 3.5.4 allows a channel to be bypassed for up to 8 hours for testing without taking Actions for an inoperable channel if Function trip capability is maintained. ITS LCO 3.3.1, Note to Required Actions for Condition H, maintains this allowance for surveillance testing and setpoint adjustment of other channels. The 8-hour bypass allowance of CTS 3.5.4 is being maintained in ITS based on CLB.

RAI 7

d. CTS Table 4.1-1, Item 8, requires a channel test every quarter; ITS SR 3.3.1.9 maintains the requirement to perform a Trip Actuating Device Operational Test (TADOT) at a Frequency of 92 days. ITS SR 3.3.1.9 is modified by a Note that provides an exception to the definition of a TADOT that is needed because setpoint verification for undervoltage and underfrequency relays requires elaborate bench calibration and is accomplished during the channel calibration.

CTS Table 4.1-1, Item 8, requires a channel calibration of the undervoltage relay every 18 months; ITS SR 3.3.1.10 maintains the requirement to perform a Channel Calibration at a Frequency of 18 months.

e. CTS 2.3.1.B(7) establishes the trip setpoint limiting safety system setting (allowable value) for the Undervoltage 6.9 kV Bus at ≥70% of the normal voltage. This LSSS is based on the Indian Point Nuclear Generating Station Unit No. 3 Plant Manual, Volume VI: Precautions, Limitations, and Setpoints, March 1975. The allowable value for this trip fnction is shown as NA because there is no analytical limit for RCP Undervoltage. **The RCPs will continue to operate and deliver required RCS flow during an Undervoltage Condition. The reactor trip on RCP Undervoltage is a time-zero initiating event assumed in the safety analysis (FSAR, Chapter 14). The UV relay is adjusted for a nominal trip setpoint of 75% of the 6900 Vac bus voltage and the surveillance acceptance criterion used for this function is ≥70%.**

NYPA

Each of the changes described above is an administrative change with no adverse impact on safety except as noted with a cross reference to the associated description and justification.

A.18 **ITS 3.3.1, Function 12, Underfrequency RCPs (6.9 kV bus)**, is equivalent to CTS 2.3.1.B(6)(b) and CTS Table 3.5-2, Item 11, Low Frequency 6.9 kV Bus. The ITS conversion modifies the CTS requirements for Underfrequency RCPs (6.9 kV bus) as follows:

a. CTS 2.3.2.A indirectly specifies that this Function may be bypassed when ≤ 10% of rated power (P-7 interlock setpoint) (i.e., loss of flow in two loops will not result in a trip when ≤ 10% of rated power) because this Function is an anticipatory trip for the loss of coolant flow function. This is also consistent with the Applicability of CTS Table 3.5-2, Item 8, Low Flow (both one loop and two loops), which the underfrequency trip function is intended to anticipate. ITS requires this function operable in Mode 1 and associated Note (e) specifies that this Function is required only when above the P-7 (Low Power Reactor Trip Block) interlock. Therefore, there is no change to the Applicability of this Function.

b. CTS Table 3.5-2 requires 3 operable channels with a minimum degree of redundancy of 2. This combination creates a requirement for 4 channels (1 channel per RCP bus) and requires that an inoperable channel be placed in trip. Therefore, ITS 3.3.1, Function 12, restates the requirement for minimum operable channels as "1 per bus" (i.e., 4 operable channels) and associated Required Action H.1 requires that an inoperable channel be placed in trip. Therefore, there is no change to the existing requirements for minimum number of operable channels or minimum degree of redundancy except that the requirements are enforced by the combination of a requirement for a minimum number of channels and a specific requirement to place an inoperable channel in trip.

c. CTS 3.5.4 specifies that the requirements for minimum Operable channels and minimum degree of redundancy be maintained by placing an inoperable channel in trip. No Completion Time is specified but one hour to complete this task is a reasonable interpretation of the exiting requirement. Under the same conditions, ITS LCO 3.3.1, Required Action H.1, allows 6 hours to place the inoperable channel in trip. This is a less restrictive change justified in WCAP-10271-P-A, Supplement 2, Rev. 1, June 1990 (See ITS 3.3.1, DOC L.3).

If requirements for minimum number of channels or minimum level of redundancy are not met, CTS Table 3.5-2 (footnote *) requires that the plant "maintain or proceed to hot shutdown within 4 hours using normal operating procedures." IP3 interprets this requirement as reactor shutdown must commence within 4 hours and completed (i.e., Mode 3) within the following 4 to 6 hours.

Under the same conditions, ITS LCO 3.3.1, Required Action H.2 (if there is a loss of redundancy), or ITS LCO 3.0.3 (if there is a loss of function), allow 6 or 7 hours, respectively, to reduce power less < P-7 setpoint (i.e., place the plant outside the Applicability for the Function). The requirement to place the plant outside of the Applicable Mode versus Mode 3 is an administrative change because it is a reasonable interpretation of the equivalent CTS requirement. The reduction in the Completion Time (elimination of the 4 hour delay until shutdown is started) is a more restrictive change (See ITS 3.3.1, DOC M.5).

CTS 3.5.4 allows a channel to be bypassed for up to 8 hours for testing without taking Actions for an inoperable channel if Function trip capability is maintained. ITS LCO 3.3.1, Note to Required Actions for Condition H, maintains this allowance for surveillance testing and setpoint adjustment of other channels. The 8-hour bypass allowance of CTS 3.5.4 is being maintained in ITS based on CLB. RAI-01

d. CTS Table 4.1-1, Item 8, requires a channel test every quarter; ITS SR 3.3.1.9 maintains the requirement to perform a Trip Actuating Device Operational Test (TADOT) at a Frequency of 92 days. ITS SR 3.3.1.9 is modified by a Note that provides an exception to the definition of a TADOT that is needed because setpoint verification for undervoltage and underfrequency relays requires elaborate bench calibration and is accomplished during the channel calibration.

   CTS Table 4.1-1, Item 8, requires a channel calibration of the underfrequency relay every 24 months; ITS SR 3.3.1.10 maintains the requirement to perform a Channel Calibration at a Frequency of 24 months.

e. CTS 2.3.1.B(6.b) establishes the trip setpoint limiting safety system setting (allowable value) for the for the Underfrequency 6.9 kV Bus trip at > 57.2 cps (cycles per second). This LSSS is based on the Indian Point Nuclear Generating Station Unit No. 3 Plant Manual, Volume VI: Precautions, Limitations, and Setpoints, March 1975. ITS 3.3.1, Function 12, Underfrequency 6.9 kV Bus trip, establishes the allowable value at > 57.2 Hertz because ITS uses allowable values calculated in accordance with Engineering Standards Manual IES-3 and IES 3-B, Instrument Loop Accuracy and Setpoint Calculation Methodology (IP3) (See ITS 3.3.1, DOC L.1).

Each of the changes described above is an administrative change with no adverse impact on safety except as noted with a cross reference to the associated description and justification.

A.19 **ITS 3.3.1, Function 13, Steam Generator (SG) Water Level Low Low,** is equivalent to CTS 2.3.1.C(2) and CTS Table 3.5-2, Function 9, Lo Lo Steam Generator (SG) Water Level. The ITS conversion modifies the CTS requirements for Steam Generator (SG) Water Level Low Low as follows:

a. CTS 3.5 does not specify an Applicability for this Function but CTS Table 3.5-2 establishes an implied Applicability by requiring that the plant be in hot shutdown (Mode 3) if requirements cannot be met. ITS requires this function operable in Modes 1 and 2. Therefore, there is no change to the existing Applicability requirement.

b. CTS Table 3.5-2 requires 2 channels per loop with a minimum degree of redundancy of 1 channel per loop. This combination creates a requirement for 3 channels per loop with no more than 1 channel per loop in trip and enforces an unstated requirement that an inoperable channel be placed in trip (see 3.3.1, DOC A.34). ITS 3.3.1, Function 13, Steam Generator (SG) Water Level Low Low, requires 3 channels per steam generator (SG) for each of the 4 SGS and Required Action E.1 will also require that an inoperable channel be placed in trip. Therefore, there is no change to the existing requirements for minimum number of operable channels or minimum degree of redundancy except that the requirements are enforced by the combination of a requirement for a minimum number of channels and a specific requirement to place an inoperable channel in trip.

c. CTS 3.5.4 specifies that the requirements for minimum Operable channels and minimum degree of redundancy be maintained by placing an inoperable channel in trip. No Completion Time is specified but one hour to complete this task is a reasonable interpretation of the exiting requirement. Under the same conditions, ITS LCO 3.3.1, Required Action E.1, allows 6 hours to place the inoperable channel in trip. This is a less restrictive change justified in WCAP-10271-P-A, Supplement 2, Rev. 1, June 1990 (See ITS 3.3.1, DOC L.3).

If requirements for minimum number of channels or minimum level of redundancy are not met, CTS Table 3.5-2 (footnote *) requires that the plant "maintain or proceed to hot shutdown within 4 hours using normal operating procedures." IP3 interprets this requirement as reactor shutdown must commence within 4 hours and completed (i.e., Mode 3) within the following 4 to 6 hours. Under the same conditions, ITS LCO 3.3.1, Required Action E.2 (if there is a loss of redundancy), or ITS LCO 3.0.3 (if there is a loss of function), allow 6 or 7 hours, respectively, to be in Mode 3. This is a more restrictive change (See ITS 3.3.1, DOC M.5).

CTS 3.5.4 allows a channel to be bypassed for up to 8 hours for testing without taking Actions for an inoperable channel if Function trip capability is maintained. ITS LCO 3.3.1, Note to Required Actions for Condition E, maintains this allowance for surveillance testing and setpoint adjustment of other channels. The 8-hour bypass allowance of CTS 3.5.4 is being maintained in ITS based on CLB.

RAI-07

d. CTS Table 4.1-1, Item 10, requires a channel check every shift; ITS SR 3.3.1.1 maintains this requirement at the same Frequency by requiring a channel check every 12 hours.

   CTS Table 4.1-1, Item 10, requires a channel test every quarter; ITS SR 3.3.1.7 maintains the requirement to perform a Channel Operation Test (COT) at a Frequency of 92 days.

   CTS Table 4.1-1, Item 10, requires a channel calibration every 24 months; ITS SR 3.3.1.10 maintains the requirement to perform a Channel Calibration at a Frequency of 24 months.

e. CTS 2.3.1.C(2) establishes the trip setpoint limiting safety system setting (allowable value) for the for the Steam Generator (SG) Water Level Low Low at ≥ 5% of narrow range instrument span. This LSSS is based on the Indian Point Nuclear Generating Station Unit No. 3 Plant Manual, Volume VI: Precautions, Limitations, and Setpoints, March 1975. ITS 3.3.1, Function 13, Steam Generator (SG) Water Level Low Low, establishes the allowable value at ≥ 3.54% of narrow range instrument span because ITS uses allowable values calculated in accordance with Engineering Standards Manual IES-3 and IES 3-B, Instrument Loop Accuracy and Setpoint Calculation Methodology (IP3) (See ITS 3.3.1, DOC L.1).

Each of the changes described above is an administrative change with no adverse impact on safety except as noted with a cross reference to the associated description and justification.

A.20 **ITS 3.3.1, Function 14, SG Water Level Low Coincident with Steam Flow/Feedwater Flow Mismatch**, is not required by the CTS because, as stated in the CTS Bases, steam-feedwater flow mismatch trip is not used in the transient and accident analysis (FSAR Section 14). ITS 3.3.1, Function 14, SG Water Level Low Coincident with Steam Flow/Feedwater Flow Mismatch, is included in the ITS because this Function is assumed to provide a diverse and/or redundant reactor trip initiation in response to a loss of feedwater event. The inclusion of the Function in the ITS is a more restrictive change (see 3.3.1, DOC M.9).

a. The Applicability for ITS 3.3.1, Function 14, SG Water Level Low Coincident with Steam Flow/Feedwater Flow Mismatch, is Modes 1 and 2 which is consistent with the function it is intended to anticipate, ITS 3.3.1, Function 13, Steam Generator (SG) Water Level Low Low.

b. ITS 3.3.1, Function 14, SG Water Level Low Coincident with Steam Flow/Feedwater Flow Mismatch, requires 2 channels of SG Water Level -Low per SG and 2 channels of Steam Flow/Feed Flow mismatch per SG to ensure that a single failure will not prevent actuation.

c. ITS LCO 3.3.1, Required Action E.1, will allow 6 hours to place the inoperable channel in trip. This AOT is justified in WCAP-10271-P-A, Supplement 2, Rev. 1, June 1990.

If requirements for minimum number of channels or minimum level of redundancy are not met, ITS LCO 3.3.1, Required Action E.2 (if there is a loss of redundancy), or ITS LCO 3.0.3 (if there is a loss of function), will allow 6 or 7 hours, respectively, to be in Mode 3.

d. ITS SR 3.3.1.1 is added to require a channel check every 12 hours.

ITS SR 3.3.1.7 is added to require a Channel Operation Test (COT) at a Frequency of 92 days.

ITS SR 3.3.1.10 is added to a Channel Calibration at a Frequency of 24 months.

e. CTS does not establish an allowable value for SG Water Level Low Coincident with Steam Flow/Feedwater Flow Mismatch.

Table 3.3.1-1 identifies the Technical Specification Allowable Value for this trip function as not applicable (NA) because the LCO 3.3.1, Function 13, Steam Generator Water Level-Low Low, is used to bound the analysis for a loss of feedwater event. The allowable values required for OPERABILITY of Function 13 is ≥4.0%. The surveillance acceptance criterion used for Function 14 are ≥7.5% narrow range level and 3.3E+5 pounds per hour steam flow/feedwater flow mismatch.

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A.21 **ITS 3.3.1, Function 15, Turbine Trip-Auto Stop Oil Pressure**, is equivalent to CTS 2.3.1.C(3) and CTS Table 3.5-2, Function 12, Turbine Trip: Low auto stop oil pressure. The ITS conversion modifies the CTS requirements for Turbine Trip-Auto Stop Oil Pressure as follows:

a. CTS 2.3.1.C.3 and CTS 2.3.2.B establishes an Applicability for this Function as whenever the reactor is ≥ 50% RTP. ITS requires this function operable in Mode 1 and associated Note (h) specifies that this Function is required only when above the P-8 interlock. Therefore, there is no change to the Applicability of this Function.

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b. CTS Table 3.5-2 requires 2 operable channels with a minimum degree of redundancy of 1. This combination creates a requirement for 3 channels with no more than 1 channel in trip and enforces an unstated requirement that an inoperable channel be placed in trip (see 3.3.1, DOC A.34). ITS requires 3 channels and associated Required Action J.1 requires that an inoperable channel be placed in trip within 6 hours (see 3.3.1, DOC L.3). Therefore, there is no change to the existing requirements for minimum number of operable channels or minimum degree of redundancy except these requirements are enforced by the combination of a requirement for a minimum number of channels and a specific requirement to place an inoperable channel in trip.

c. CTS 3.5.4 specifies that the requirements for minimum Operable channels and minimum degree of redundancy be maintained by placing an inoperable channel in trip. No Completion Time is specified but one hour to complete this task is a reasonable interpretation of the exiting requirement. Under the same conditions, ITS LCO 3.3.1, Required Action J.1, allows 6 hours to place the inoperable channel in trip. This is a less restrictive change justified in WCAP-10271-P-A, Supplement 2, Rev. 1, June 1990 (See ITS 3.3.1, DOC L.3).

If requirements for minimum number of channels or minimum level of redundancy are not met, CTS Table 3.5-2 (footnote *) requires that the plant "maintain reactor power below 10% of full power." No Completion Time is specified. Under the same conditions, ITS LCO 3.3.1, Required Action J.2 (if there is a loss of redundancy), or ITS LCO 3.0.3 (if there is a loss of function), allow 6 or 7 hours, respectively, to reduce power less < P-7 setpoint (i.e., place the plant outside the Applicability for the Function). The requirement to place the plant outside of the Applicable Mode versus Mode 3 is an administrative change because it is a reasonable interpretation of the equivalent CTS requirement.

CTS 3.5.4 allows a channel to be bypassed for up to 8 hours for testing without taking Actions for an inoperable channel if Function trip capability is maintained. ITS LCO 3.3.1, Note to Required Actions for Condition H, maintains this allowance for surveillance testing and setpoint adjustment of other channels.

The 8-hour bypass allowance of CTS 3.5.4 is being maintained in ITS based on CLB. RAI- 01

d. CTS Table 4.1-1, Item 21, requires a channel calibration every 24 months; ITS SR 3.3.1.10 maintains the requirement to perform a Channel Calibration at a Frequency of 24 months.

Although CTS Table 4.1-1, Item 21, does not include a specific requirement to verify operability by actuation of the end device, the CTS 1.9.3 definition of 'channel calibration' requires verification of function operability. Therefore CTS Table 4.1-1, item 21 is equivalent to both ITS SR 3.3.1.10 (channel calibration) and SR 3.3.1.15 (TADOT). Establishing a 24 month frequency for SR 3.3.1.15 is an administrative change based on current licensing basis. RAI- 18

e. CTS 2.3.1.C(2) does not establish any trip setpoint limiting safety system setting (allowable value) for the for the Turbine Trip-Auto Stop Oil Pressure. ITS 3.3.1, Function 15, Turbine Trip-Auto Stop Oil Pressure, establishes the allowable value at ≤ 1.6 psig. This allowable value was calculated in accordance with Engineering Standards Manual IES-3 and IES 3-B, Instrument Loop Accuracy and Setpoint Calculation Methodology (IP3). Inclusion of this acceptance criteria in the ITS is an administrative change with no impact on safety because this acceptance criteria is consistent with current analysis assumptions and procedural requirements.

A.22 **ITS 3.3.1, Function 16, (Reactor Trip) Safety Injection (SI) Input from ESFAS**, is not specifically identified as a Reactor Protection System Function in the CTS. CTS treats this Function as part of the Reactor Protection Relay Logic (CTS Table 3.5-2, Item 14), and the Engineered Safety Features Initiation Relay Logic (CTS Table 3.5-3, Item 6) except as discussed below. The ITS conversion modifies the CTS requirements for a reactor trip initiation by a safety injection signal as follows:

a. CTS 3.5 does not specify an Applicability for this Function but CTS Table 3.5-2 (Reactor Protection Relay Logic) establishes an implied Applicability by requiring that the plant be in hot shutdown (Mode 3) if requirements cannot be met. (Applicability requirements associated with ESFAS do not apply because there is no need for a reactor trip signal except in Mode 1 and 2.) ITS requires this function operable in Modes 1 and 2. Therefore, there is no change to the existing Applicability requirement.

b. CTS Table 3.5-2 requires 2 operable channels with a minimum degree of redundancy of 1 for RPS and 2 operable trains with a minimum degree of redundancy of 1 for ESFAS. This combination creates a requirement for 2 trains and requires that an inoperable train be restored to Operable because placing an inoperable train in trip will cause a reactor trip (see 3.3.1, DOC A.34). Therefore, ITS 3.3.1, Function 16, restates the requirement for minimum operable channels as "2 trains" and associated Required Action K.1 requires that an inoperable train be restored to Operable (see 3.3.1, DOC A.34) within 6 hours (see 3.3.1, DOC L.3). Therefore, there is no change to the existing requirements for minimum number of operable channels or minimum degree of redundancy except these requirements are enforced by the combination of a requirement for a minimum number of channels and a specific requirement to restore a channel to Operable status (versus placing it in trip which would cause a reactor trip).

c. CTS 3.5.4 specifies that the requirements for minimum Operable channels and minimum degree of redundancy be maintained by placing an inoperable channel in trip or, in this chase, restoring the channel to Operable. No Completion Time is specified but one hour to complete this task is a reasonable interpretation of the exiting requirement. Under the same conditions, ITS LCO 3.3.1, Required Action K.1, allows 6 hours to restore an inoperable channel. This is a less restrictive change justified in WCAP-10271-P-A, Supplement 2, Rev. 1, June 1990 (See ITS 3.3.1, DOC L.3).

If requirements for minimum number of channels or minimum level of redundancy are not met, CTS Table 3.5-2 (footnote *) requires that the plant "maintain or proceed to hot shutdown within 4 hours using normal operating procedures." IP3 interprets this requirement as reactor shutdown must commence within 4 hours and completed (i.e., Mode 3) within the following 4 to 6 hours. Under the same conditions, ITS LCO 3.3.1, Required Action K.2 (if there is a loss of redundancy), or ITS LCO 3.0.3 (if there is a loss of function), allow 6 or 7 hours, respectively, to be in Mode 3. This is a more restrictive change (See ITS 3.3.1, DOC M.5).

CTS 3.5.4 allows a train to be bypassed for up to 8 hours for testing without taking Actions for an inoperable channel if Function trip capability is maintained. ITS LCO 3.3.1, Note to Required Actions for Condition K, maintains this allowance for surveillance testing and setpoint adjustment of other channels. The 8-hour bypass allowance of CTS 3.5.4 is being maintained in ITS based on CLB. RAI-01

d. CTS 4.5.A.1 requires an operational test of Safety Injection every 24 months. Specifically, CTS 4.5.A.1 requires that a test safety injection signal be applied to initiate operation of the system. The test will be considered satisfactory if control board indication and visual observations indicate that all components have received the safety injection signal in the proper sequence and timing, that is, the appropriate pump breakers shall have opened and closed, and the appropriate valves shall have completed their travel. ITS SR 3.3.1.14 requires a Trip Actuating Device Operational Test (TADOT) at a Frequency of 24 months. ITS SR 3.3.1.14 is modified by a Note that provides an exception to the definition of a TADOT that is needed because ESFAS Initiation does not have a setpoint (ESFAS either initiates or it does not).

e. The allowable values for ITS 3.3.1, Function 16, (Reactor Trip) Safety Injection (SI) Input from ESFAS, are determined as described in the Discussion of Changes for ITS LCO 3.3.2, ESFAS Instrumentation.

Each of the changes described above is an administrative change with no adverse impact on safety except as noted with a cross reference to the associated justification.

A.23 **ITS 3.3.1, Function 18, Reactor Trip Breakers**, is equivalent to CTS Table 3.5-2, Function 13, Reactor Trip Breakers (Note that ITS has a separate Function for the reactor trip breaker undervoltage and shunt trip mechanisms). The ITS conversion modifies the CTS requirements for

DOCs A.29 and A.30).

Each of the changes described above is an administrative change with no adverse impact on safety except as noted with a cross reference to the associated description and justification.

A.28 **ITS 3.3.1, Function 17.c, Power Range Neutron Flux (P-8)**, is an interlock that automatically enables the Reactor Coolant Flow – Low (Single Loop) and RCP Breaker Position (Single Loop) reactor trip on low flow in one or more RCS loops on increasing power. This interlock automatically enforces requirements established by CTS 2.3.2.B. The P-8 interlock is actuated at approximately 50% RTP as determined by two-out-of-four NIS power range detectors. ITS 3.3.1, Table 3.3.1-1, maintains these requirements as follows:

a. ITS 3.3.1, Function 17.c, P-8, is required to be Operable in Mode 1 to ensure that P-8 performs it design function of ensuring that the ITS 3.3.1 Functions enabled by this interlock are enabled before exceeding the P-8 setpoint.

b. ITS 3.3.1, Function 17.c, requires 4 Operable channels of the P-8 function. Therefore, there is no change to the existing requirements.

c. ITS 3.3.1, Required Action N.1, specifies that if a channel is inoperable, the operator must verify interlock is in the required state for plant conditions. Therefore, this requires that the ITS 3.3.1 Functions enabled by this interlock are Operable when required. Therefore, there is no change to the existing requirements.

d. CTS Table 4.1-1, Item 1 (Remark 2), Nuclear Power Range, requires the testing for the P-8 Interlock consistent with the requirements for testing Nuclear Power Range instruments. ITS SR 3.3.1.11 and ITS SR 3.3.1.13 maintain this requirement and require periodic Channel Operation Test and Channel Calibrations for this interlock.

e. CTS 2.3.2.B establishes the trip setpoints for the P-8 interlock at nuclear flux ≤ 50% of rated power. This value was established based on Indian Point Nuclear Generating Station Unit No. 3 Plant Manual Volume VI: Precautions, Limitations, and Setpoints, March 1975, and are considered conservative. The allowable value is NA for this Function because there is no corresponding analytical limit modeled in the accident analysis. The surveillance acceptance criterion used for this Function is ≤50% RTP.

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Each of the changes described above is an administrative change with no adverse impact on safety except as noted with a cross reference to the associated description and justification.

A.29 **ITS 3.3.1, Function 17.d, Power Range Neutron Flux (P-10)**, is an interlock that automatically enables ITS 3.3.1, Function 2.b, Power Range Neutron Flux-Low (trip) and ITS 3.3.1, Function 3, Intermediate Range Neutron Flux (trip) on decreasing power. This interlock also provides a permissive to block the SRM, IRM and the Power Range Neutron Flux-Low trips when increasing reactor power. This interlock automatically enforces requirements established by CTS 2.3.2.A.1 by serving as an input to P-7. The P-10 interlock is actuated at approximately 10% RTP as determined by two-out-of-four NIS power range detectors. ITS 3.3.1, Table 3.3.1-1, maintains these requirements as follows:

a. ITS 3.3.1, Function 17.d, P-10, is required to be Operable in Modes 1 and 2 to ensure that P-10 performs it design function of ensuring that SRM, IRM and the PR Neutron Flux-Low trips are actuated when required and can be blocked only when not needed.

b. ITS 3.3.1, Function 17.d, requires 4 Operable channels of the P-10 function. Therefore, there is no change to the existing requirements.

c. ITS 3.3.1, Required Action M.1, specifies that if a channel is inoperable, the verify interlock is in the required state for plant conditions. Therefore, this requires that the ITS 3.3.1 Functions enabled by this interlock are Operable when required. Therefore, there is no change to the existing requirements.

d. CTS Table 4.1-1, Item 1 (Remark 2), Nuclear Power Range, requires the testing for the P-10 Interlock consistent with the requirements for testing Nuclear Power Range instruments. ITS SR 3.3.1.11 and ITS SR 3.3.1.13 maintain this requirement and require periodic Channel Operation Test and Channel Calibrations for this interlock.

e. CTS 2.3.2.A establishes the trip setpoints for the P-10 interlock at nuclear flux < 10% of rated power. This value was established based on Indian Point Nuclear Generating Station Unit No. 3 Plant Manual Volume VI: Precautions, Limitations, and Setpoints, March 1975, and are considered conservative. The allowable value is NA for this Function because there is no corresponding analytical limit modeled in the accident analysis. The surveillance acceptance criterion used for this Function is <10% RTP.

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Each of the changes described above is an administrative change with no adverse impact on safety except as noted with a cross reference to the associated description and justification.

A.30 **ITS 3.3.1, Function 17.e, Turbine First Stage Pressure (P-7 Input)**, is one of the inputs to the P-7 interlock which is an interlock that enables various Reactor Protection System trips that are required only when operating above the P-7 setpoint (approximately 10% power) and disabling these trip when reactor power is below the P-7 setpoint. This interlock automatically enforces requirements established by CTS 2.3.2.A.2. ITS 3.3.1, Table 3.3.1-1, maintains these requirements as follows:

a. ITS 3.3.1, Function 17.d, is required to be Operable in Mode 1 to ensure that P-7 performs it design function of ensuring that the various ITS 3.3.1 Functions enabled by this interlock are enabled before exceeding the P-7 setpoint.

b. ITS 3.3.1, Function 17.b, requires 2 Operable channels of the Turbine First Stage Pressure (P-7 Input) function.

c. ITS 3.3.1, Required Action N.1, specifies that if a channel is inoperable, the verify interlock is in the required state for plant conditions. Therefore, this requires that the various ITS 3.3.1 Functions enabled by this interlock are Operable when required.

d. CTS Table 4.1-1, Item 19, Turbine First Stage Pressure, requires daily Channels Checks, quarterly Channel Operational Tests, and 24 month Channels Calibrations. ITS SR 3.3.1.1, ITS SR 3.3.1.11 and ITS SR 3.3.1.13 maintain these requirements at the existing Frequency.

e. CTS 2.3.2.A.2 establishes the trip setpoints for the Turbine First Stage Pressure (P-7 Input) interlock at nuclear flux > 10% of rated power. This value was established based on Indian Point Nuclear Generating Station Unit No. 3 Plant Manual Volume VI: Precautions, Limitations, and Setpoints, March 1975, and are considered conservative. The allowable value is NA for this Function because there is no corresponding analytical limit modeled in the accident analysis. The surveillance acceptance criterion used for this Function is <10% RTP.

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Each of the changes described above is an administrative change with no adverse impact on safety except as noted with a cross reference to the associated description and justification.

A.31 CTS 3.5.2 specifies that plant operation shall be permitted to continue in accordance with Tables 3.5-2 through 3.5-4 for instrumentation testing or instrumentation channel failure; and, no more than one channel of a particular protection channel set shall be tested at the same time. ITS establishes equivalent requirements and allowances by establishing specific Required Actions for each Function. Specifically, ITS 3.3.1, Required Actions (as modified by TSTF-135, Rev.2 (WOG-58), RPS and ESFAS Instrumentation) and associated Notes establishing time limits for testing, always require verification that the inoperable channel does not result in a loss of trip Function before allowable out of service time may be applied for testing or inoperability. Additionally, ITS Required Action Notes limit the number of channels made inoperable by testing by requiring that the trip function be maintained during testing (although redundancy may be lost). This is an administrative change with no impact on safety because there is no error or this change have any impact on safety.

A.36 CTS Tables 3.5-2, 3.5-3 and 3.5-4 establish minimum requirements for protective instrumentation Operability and specifies the Required Actions if these requirements are not met. Typically, these Required Actions specify proceed to or "maintain hot shutdown." ITS LCO 3.3.1 and ITS LCO 3.3.2 specify specific Required Actions are designed to place the plant outside the Applicable Modes or conditions. This is an administrative change with no impact on safety because it is a reasonable interpretation of the existing requirement.

A.37 CTS 3.5.4 allows a channel to be bypassed for up to 8 hours for testing without taking Actions for an inoperable channel if Function trip capability is maintained. ITS LCO 3.3.1, Notes to various Required Actions, maintains this allowance for surveillance testing and setpoint adjustment of other channels. The 8-hour bypass allowance of CTS 3.5.4 is being maintained in ITS based on CLB. RAI-01

Additionally, ITS LCO 3.3.1, Note 2 to Actions, clarifies this allowance as follows: When a channel or train is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 8 hours provided the associated Function maintains RPS trip capability.

This is an administrative change with no adverse impact on safety because it is a reasonable interpretation of the equivalent CTS requirement in CTS 3.5.4.

MORE RESTRICTIVE

M.1 ITS 3.3.1, Function 4, SRM Flux (trip), and ITS 3.3.1, Function 3, IRM Flux (trip), are added to require one channel of the SRM and one channel of the IRM trip function (as described in ITS 3.3.1, DOCs A.6 and A.7). This change is needed because these functions provide redundant protection to the Power Range Neutron Flux-Low Setpoint trip Function for an uncontrolled RCCA bank rod withdrawal accident from a subcritical condition during startup. One channel is acceptable because administrative controls also prevent the uncontrolled withdrawal of cannot be met. ITS 3.3.1, Function 1, requires this function operable in Modes 1 and 2 and in Mode 3, 4 and 5 if the Rod Control System is capable of rod withdrawal or all rods are not fully inserted (ITS Table 3.3.1-1, Note a). Expanding the Applicability for Manual Reactor Trip Function to include Mode 3, 4 and 5 if the Rod Control System is capable of rod withdrawal and one or more rods are not fully inserted is a more restrictive change. This change is needed because having the Manual Reactor Trip Function is prudent whenever control rods are not fully inserted. Additionally, inadvertent control rod withdrawal is possible unless the Control Rod Drive (CRD) System is made not capable of withdrawing rods when in Mode 3, 4 and 5. In Mode 6, the CRDMs are normally disconnected from the control rods or control rods are not otherwise permitted to be withdrawn. Therefore, the manual initiation Function is not required in Mode 6.

In conjunction with expanding the Applicability of the Manual Trip Function, ITS 3.3.1, Required Actions C.2.1 and C.2.2, are added to require that all control rods be fully inserted and that the control rod drive system be made incapable of rod withdrawal whenever Mode 3, 4 or 5 requirements or completion times cannot be met. ITS 3.3.1, Required Actions C.2.1 and C.2.2, place the plant outside the expanded Applicability.

Although ITS 3.3.1, Condition C, applies when one of the two manual trip functions is inoperable, Required Actions C.2.1 and C.2.2, and the associated 48 hour AOT will apply when both manual trip channels are inoperable in Modes 3, 4 and 5 because defaulting to LCO 3.0.3 will not place the plant outside of the Applicable Mode and conditions. This is acceptable because of the low probability of an event requiring manual trip capability when in these Modes.

This change is acceptable because it does not introduce any operation which is un-analyzed while requiring manual reactor trip capability whenever the Rod Control System is capable of rod withdrawal or all rods are not fully inserted. This change has no adverse impact on safety.

M.4 When in Mode 2, ITS SR 3.3.1.8 establishes a new requirement to perform a COT for ITS 3.3.1, Function 4, SRM Neutron Flux (trip), within 4 hours after reducing power below the P-6 (IRM Flux interlock) setpoint (See RAI-10

ITS 3.3.1, DOC A.7). Additionally, ITS SR 3.3.1.8 includes a new requirement to perform a COT for ITS 3.3.1, Function 3, IRM Neutron flux (trip), within 12 hours after reducing power below the P-10 setpoint RAI-10 (See ITS 3.3.1, DOC A.6). These changes are needed because they ensure that the COT will verify function Operability if the plant expects to stay critical, while allowing this SR to be skipped if the reactor shutdown will be completed promptly. Finally, when in Modes 3, 4 or 5 with CRD system capable of rod withdrawal and one or more rods not fully inserted, ITS SR 3.3.1.7 establishes a new requirement to perform a COT, for ITS 3.3.1, Function 4, within 4 hours after entering Mode 3 from RAI-09 Mode 2 and every 92 days thereafter. This change is needed because the source range trip is the only RPS automatic protection function required in MODES 3, 4, and 5.

This change is acceptable because it does not introduce any operation which is un-analyzed while prompt verification of the Operability of the required IRM and SRM trip functions after entering the Applicable mode. This change has no adverse impact on safety.

M.5 This change eliminates 4 hours from the time required to initiate plant shutdown when requirements for RPS instrument channel redundancy are not restored within the required Completion Time or there is a loss of a required RPS instrument trip function.

Specifically, if requirements for minimum number of channels or minimum level of redundancy are not met, CTS Table 3.5-2 (footnote *) requires that the plant "maintain or proceed to hot shutdown within 4 hours using normal operating procedures." IP3 interprets this requirement as reactor shutdown must commence within 4 hours and completed (i.e., Mode 3) within the following 4 to 6 hours. Under the same conditions, ITS LCO 3.3.1, Required Actions for failure to restore required redundancy within the specified Completion Time (if there is a loss of redundancy), or ITS LCO 3.0.3 (if there is a loss of function), allow 6 or 7 hours, respectively, to be in Mode 3.

This change is needed when there is a loss of instrument function because it ensures that the plant is promptly placed outside the Applicable Mode when a safety function assumed in the accident analysis is not Operable. This change is needed when requirements for RPS data. This change is acceptable because it does not introduce any operation which is un-analyzed while establishing an explicit requirement for periodic calibration of the source, intermediate and power range nuclear detectors.. Therefore, this change has no adverse impact on safety.

M.8 (not used) RAI-18

M.9 ITS 3.3.1, Function 14, SG Water Level Low Coincident with Steam Flow/Feedwater Flow Mismatch, is not required by the CTS because, as stated in the CTS Bases, steam-feedwater flow mismatch trip is not used in the transient and accident analysis (FSAR Section 14). ITS 3.3.1, Function 14, SG Water Level Low Coincident with Steam Flow/Feedwater Flow Mismatch, is included in the ITS. This change is needed because this Function is assumed to provide a diverse and/or redundant reactor trip initiation in conjunction with SG Water Level Low (ITS 3.3.1, Function 13, Steam Generator (SG) Water Level Low Low) in response to a loss of feedwater event. This change is acceptable because it does not introduce any operation which is un-analyzed while establishing an explicit requirement for a diverse and/or redundant reactor trip function in response to a loss of feedwater event.

M.10 CTS 2.3.2.A specifies that reactor trips on low pressurizer pressure, high pressurizer level, low reactor coolant flow for two or more loops, and turbine trip must be unblocked when specified conditions are met. CTS 2.3.2.B specifies that single loop loss of flow reactor trips may be bypassed when the power range nuclear instrumentation indicates < 50% RTP. Although each of these requirements is enforced by an automatic interlock function, CTS does not explicitly require Operability of the interlock function. ITS 3.3.1, Function 17, Reactor Protection System Interlocks, is added to require Operability of the following: 17.a, Intermediate Range Neutron Flux (P-6) Interlock; 17.b, Low Power Reactor Trips Block (P-7) Interlock; 17.c, Power Range Neutron Flux (P-8) Interlock; 17.d, Power Range Neutron Flux (P-10) Interlock; and 17.e, Turbine First Stage Pressure (P-7 Input) interlock. If any of these interlocks is not Operable, ITS 3.3.1, Required Actions M.1 and N.1, require that the interlock be established consistent with plant conditions. This is consistent with the CTS requirements. Therefore, this change has no adverse impact on safety.

LESS RESTRICTIVE

L.1 CTS trip setpoint limiting safety system setting (allowable value) are based on the IP3 Plant Manual, Volume VI: Precautions, Limitations, and Setpoints, March 1975. ITS will use allowable values calculated using methodologies that conform to Regulatory Guide 1.105, Instrument Setpoints for Safety-Related Systems, Rev. 2 dated February 1986, and ISA-RP67.04, Part II, Draft 9, Methodologies for the Determination of Setpoints for Nuclear Safety Related Instrumentation, dated 3/22/91. This change is needed because the limiting safety system settings established by IP3 Plant Manual, Volume VI, were based on information available at the time regarding instrument performance and methods available at the time for calculating setpoints. This change is acceptable because the allowable values will ensure that sufficient allowance exists between this actual setpoint and the analytical limit to account for known instrument uncertainties. For example these may include design basis accident temperature and radiation effects or process dependent effects. This will provide assurance that the analytical limit will not be exceeded if the allowable value is satisfied. This change has no significant adverse impact on safety because the existing limiting safety system setting and the proposed allowable values used the information and methods available at the time to determine instrument settings that ensure that safety limits are not exceeded during any event.

RAI-OD

L.2 CTS 3.5.2 specifies the following: "No more than one channel of a particular protection channel set shall be tested at the same time. By definition, an instrumentation channel failure shall not be regarded as a channel being tested." ITS LCO 3.0.5 establishes an allowance for restoring equipment to service under administrative controls when it has been removed from service or declared inoperable to comply with Actions. The purpose of this Specification is to provide an exception to LCO 3.0.2 (e.g., to not comply with the applicable Required Action(s)) to allow the performance of SRs to demonstrate: (a)The Operability of the equipment being returned to service: or (b) The Operability of other equipment. The ITS Bases for LCO 3.0.5 include the example of this allowance as taking an inoperable channel or trip system out of the tripped condition to prevent the trip function from occurring during the performance of an SR on another channel in the other trip system. A similar example of demonstrating the OPERABILITY of other equipment is taking an inoperable channel or trip system out of the tripped condition to permit the logic to function and indicate the appropriate response during the performance of an SR on another channel in the same trip system. Therefore, ITS LCO 3.0.5 supersedes these restrictions in CTS 3.5.2. This change is acceptable because of the following: (1) ITS 3.3.1, Required Actions and associated Notes establishing time limits for testing, assumes there will be verification that the inoperable channel does not result in a loss of trip Function before allowable out of service time may be applied for testing or inoperability; (2) the duration in test (and therefore, time without single failure tolerance) is limited; and (3) the Westinghouse analog channel fault tree analysis used in WCAP-10271 assumes that more than one channel will be tested at a time. Therefore, this change has no significant impact on safety.

L.3 CTS 3.5.3 and CTS 3.5.4 specify that if requirements for minimum number of channels and/or minimum degree of redundancy cannot be achieved, than the actions specified for that Function, typically plant shutdown, must be initiated immediately (usually interpreted as within one hour). The combination of requirements for minimum number of channels and/or minimum degree of redundancy typically requires that the first inoperable channel for a Function be placed in trip to meet requirements and requires a plant shutdown when a second channel on a single function becomes inoperable. Under the same conditions, ITS 3.3.1 (as modified by TSTF-135 (WOG-58), RPS and ESFAS Instrumentation), Required Actions, allow 6 hours to restore a channel or place it in trip. In conjunction with this change, ITS 3.3.1 (as modified by TSTF-135 (WOG-58)), Required Actions, always require verification that the inoperable channel does not result in a loss of trip Function before the 6 hour allowable out of service time may be applied. The need for and justification for this change is included in WCAP-10271, "Evaluation of Surveillance Frequencies and Out-of-Service Times for the Reactor Protection Instrumentation System" including Supplement 1, and WCAP-10271, Supplement 2, "Evaluation of Surveillance Frequencies and Out of Service Times for the Engineered Safety Features Actuation Systems." This justification was approved by the NRC in Safety Evaluations dated February 1985 and February 1989. Confirmation of the applicability of WCAP-10271 to the Indian Point 3 design and operation has already been confirmed by the NYPA and reviewed by the NRC as part of Technical Specification Amendment 107, dated March 22, 1991.

L.4 CTS Table 4.1-1, Item 1, requires a channel test of the power range instruments every quarter with associated Note ** to Table 4.1-1 requiring this test to be performed not less than 30 days prior to a reactor startup. ITS SR 3.3.1.8 maintains the requirement to perform a COT prior to reactor startup but only if the SR has not been performed in the previous 92 days (i.e. at a 92 day Frequency)

CTS Table 4.1-1, Item 2 (Frequency P(2)), requires that IRM response to a simulated signal (i.e., Channel Operational Test) be performed "prior to each startup if not performed in the previous week." ITS SR 3.3.1.8 maintains the requirement to perform a COT; however, the Frequency is extended to 92 days.

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CTS Table 4.1-1, Item 3 (Frequency P(2)), requires that SRM response to a simulated signal (i.e., Channel Operational Test)be performed "prior to each startup if not performed in the previous week." ITS SR 3.3.1.8 maintains the requirement to perform a COT; however, the Frequency is extended to 92 days.

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The SRM trip, IRM trip, and the power range low power trip provide protection for a subcritical rod withdrawal event. Collectively, the SRM trip, IRM trip, and the power range low power trip provide a redundant and diverse protection for this event. Although FSAR states that the SRM trip and IRM trip are not credited.

ITS 3.3.1 requires that Surveillance Tests be performed at the normal periodic Frequency only and tests are not required to be repeated prior to a specific event, such as a reactor startup. This change is acceptable because the normal periodic Surveillance Frequency is established to provide adequate assurance of the Operability of the instruments that provide these Functions. ITS SR 3.0.4 ensures that the required Surveillances have been performed within the normal specified interval prior to entering an applicable Mode or Condition. Additionally, there are redundant channels and any substantial degradation of the Power Range Neutron Flux-Low of a channel will be evident prior to the scheduled performance of these tests because of the following: Technical Specifications require Channel Checks on redundant Operable channels; and, Power Range Instrument response to reactivity changes is distinctive and well known to plant operators and nuclear instrumentation response is closely monitored during reactivity changes. Therefore, this change has no impact on safety.

L.5 CTS Table 4.1-1, Item 1 (Remark 3 with Note *), requires that the monthly calibration of the power range channels include a comparison of the upper and lower axial offset using the incore detectors. ITS SR 3.3.1.3 maintains the requirement to compare results of the incore detector measurements to NIS AFD; however, the Frequency is extended from once per month to every 31 effective full power days (EFPD). Additionally, CTS Table 4.1-1, Item 1 (Remark 3 with Note *), requires a calibration of the excore channels to the incore channels every month. ITS SR 3.3.1.6 maintains the requirement to calibrate the excore channels to the incore channels; however, the Frequency is extended from once per month to every 31 EFPDs. Extending the Frequency for ITS SR 3.3.1.3 and ITS SR 3.3.1.6 from monthly to every 31 EFPDs is acceptable because these SRs are intended to detect and make adjustments for relatively slow changes in flux patterns that are a function of core exposure. Therefore, the SR Frequency is being changed to a function of core exposure with an interval consistent with the current SR Frequency if the plant is operated at full power during the SR interval. Operating experience indicates that this Frequency is sufficient to compensate for the slow changes in neutron flux patterns during this interval. These SRs are not intended to detect flux tilts that occur quickly (e.g., a dropped rod) for which there are other indications of abnormality that prompt a verification of core power tilt. Therefore, this change has no adverse impact on safety.

L.6 CTS Table 3.5-2 (Note ****) establishes requirements to defeat rod withdrawal capability within 1 hour after the reactor is in Mode 3 for 48 hours as a result of an inoperable RTB. Therefore, CTS has an implied Applicability of the Rod Control System is capable of rod withdrawal. ITS requires this function operable if the Rod Control

System is capable of rod withdrawal or all rods are not fully inserted (ITS Table 3.3.1-1, Note a). Expansion of the applicability to include whenever all control rods are not fully inserted is a less restrictive change. This change is needed because it provides an alternative to opening the RTBs so that certain SRs can be performed (e.g., COTs on certain channels). This change is acceptable because having all control rods fully inserted meets the intent implied by opening the RTBs. Additionally, required reactor trip functions must be made Operable before any control rod can be withdrawn and the potential for a rod withdrawal event is created. Therefore, this change has no adverse impact on safety.

L.7 NUREG 1431, Rev 1, Section 3.3.1, Condition R for Reactor Trip Breakers contains Note 1 regarding an allowance to bypass one train for up to 2 hours for surveillance testing provided the other train is operable. ITS Condition L for Reactor Trip Breakers adopts the same note. This allowance is not explictly stated in the CTS. However, the CTS establishes requirements for surveillance testing the reactor trip breakers (CTS Table 4.1-1, item39), and the design of the system provides for the use of bypass breakers to allow testing of the RTBs at power as required to meet the surveillance requirement. The 2-hour time period is a reasonable period of time to perform the test and is consistent with the STS allowance. This change has no significant adverse impact on safety because the bypass configuration is a design feature to support online testing of components and the allowed time is reasonable based on the scope of testing required. In addition, periodic testing of the bypass breakers is required to ensure operability when used to perform the bypass function.

RAI-06

REMOVED DETAIL

LA.1 CTS Section 3.5, Tables 3.5-2, 3.5-3 and 3.5-4, Columns 1 and 2, identify the number of channels and the channels required to trip for each RPS and ESFAS Function. ITS LCO 3.3.1, LCO 3.3.2, LCO 3.3.3, LCO 3.3.5 and LCO 3.3.6 require that these Functions be Operable but do not provide system design details. This is acceptable because this design information is incorporated into the minimum requirements and ITS specifies the minimum requirements for Operability.

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.3.1:
"Reactor Protection System (RPS) Instrumentation"

PART 4:

No Significant Hazards Considerations
for
Changes between CTS and ITS
that are
Less Restrictive

No Significant Hazard Considerations for Changes that are Administrative, More Restrictive, and Removed Details are the same for all Packages. A Copy is included at the end of the Package.

RAI-06

NO SIGNIFICANT HAZARDS EVALUATION
ITS SECTION 3.3.1 - REACTOR TRIP SYSTEM (RTS) INSTRUMENTATION

LESS RESTRICTIVE
("L.7" Labeled Comments/Discussions)

New York Power Authority has evaluated the proposed Technical Specification change identified as "Less Restrictive" in accordance with the criteria set forth in 10 CFR 50.92, and has determined that the proposed change does not involve a significant hazards consideration. The bases for the determination that the proposed change does not involve a significant hazards consideration are discussed below.

1. Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?

   Providing an explicit time allowance to bypass a reactor trip breaker (RTB) for purposes of performing the required surveillance test makes use of an existing design feature provided for this purpose. Using the design feature to bypass the RTB is not an accident initiator and as such does not affect the probability of an accident previously evaluated. Overall unit protection is still maintained because the bypass breaker and the RTB not being tested will be opened by the actuation logic not being tested. Therefore the consequences of previously evaluated accidents is not changed. Limiting the amount of time to a reasonable period for the completion of the test ensures that relaxation of the single failure criterion is minimized.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

   The proposed change will not involve any physical changes to systems, structures, or components, or involve a change in normal plant operation. Therefore, it will not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

   This change does not involve a significant reduction in a margin of safety because an existing design feature is used for testing components that provide overall unit protection. Periodic testing of these components ensures that operabilty of components is maintained.

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.3.1:
"Reactor Protection System (RPS) Instrumentation"

PART 5:

NUREG-1431
Annotated to show differences between NUREG-1431 and ITS

⟨CTS⟩ **3.3 INSTRUMENTATION**

3.3.1 Reactor ~~Trip~~ Protection System (~~RTS~~ RPS) Instrumentation – (all locations)

⟨3.5.2⟩ LCO 3.3.1 The RTS instrumentation for each Function in Table 3.3.1-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.1-1.

ACTIONS

------------------------------------NOTE------------------------------------

⟨DOC A.32⟩ Separate Condition entry is allowed for each Function. R.1

CONDITION	REQUIRED ACTION	COMPLETION TIME
⟨3.5.3⟩ A. One or more Functions with one or more required channels or trains inoperable.	A.1 Enter the Condition referenced in Table 3.3.1-1 for the channel(s) or train(s).	Immediately T.1
⟨DOC A.3⟩ B. One Manual Reactor Trip channel inoperable.	B.1 Restore channel to OPERABLE status. OR B.2~~.1~~ Be in MODE 3. ~~AND~~ ~~B.2.2 Open reactor trip breakers (RTBs).~~	48 hours 54 hours ~~55 hours~~ T.1

(continued)

INSERT: 3.3-1-01

DELETED.

ACTIONS (continued)

<DOC A.3>
<DOC A.23>
<DOC A.24>
<DOC A.25>

<DOC A.4>
<3.5.4>

<3.10.2.9>
<SEE ITS 3.2.4>

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One channel or train inoperable.	C.1 Restore channel or train to OPERABLE status.	48 hours
	OR	
Insert: 3.3-2-01	~~C.2 Open RTBs.~~	~~49 hours~~
D. One Power Range Neutron Flux—High channel inoperable.	1. ------------NOTE------------ The inoperable channel may be bypassed for up to ~~4~~ 8 hours for surveillance testing and setpoint adjustment of other channels. 2. ----------------------------	
Insert: 3.3-2-02	D.1.~~1~~ Place channel in trip.	6 hours
	~~AND~~	
	~~D.1.2 Reduce THERMAL POWER to ≤ 75% RTP.~~	~~12~~ 24 hours
	~~OR~~	
	~~D.2.1 Place channel in trip.~~	~~6 hours~~
	~~AND~~	
		(continued)

T1

R.1

R.1

CLB.1

R.1

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT 3.3-2-01:

	C.2.1 Initiate action to fully insert all rods.	48 hours
	AND	
	C.2.2 Place the Rod control System in a condition incapable of rod withdrawal.	49 hours

INSERT 3.3-2-02:

Requirements of SR 3.2.4.2 are applicable if the Power Range Neutron Flux input to QPTR is inoperable.

ACTIONS

<DOC A.4>

<3.10.2.9>
<SEE ITS 3.2.4>

R.1

CLB.1

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. (continued)	------------~~NOTE~~------------ ~~Only required to be performed when the Power Range Neutron Flux input to QPTR is inoperable.~~ ----------------------------- ~~D.2.2 Perform SR 3.2.4.2.~~ OR D.~~3~~2 Be in MODE 3.	~~Once per 12 hours~~ 24 12 hours
E. One channel inoperable.	------------NOTE------------ The inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels. ----------------------------- E.1 Place channel in trip. OR E.2 Be in MODE 3.	8 6 hours 12 hours
~~F. THERMAL POWER > P-6 and < P-10, one Intermediate Range Neutron Flux channel inoperable.~~	~~F.1 Reduce THERMAL POWER to < P-6.~~ ~~OR~~ ~~F.2 Increase THERMAL POWER to > P-10.~~	~~2 hours~~ ~~2 hours~~

<DOC A.5>
<DOC A.8>
<DOC A.9>
<DOC A.11>
<DOC A.19>
<DOC A.20>
<3.5.4>

CLB.1

(continued)

ACTIONS (continued)

	CONDITION	REQUIRED ACTION	COMPLETION TIME	
⟨Doc A.6⟩	F ~~G~~. ~~THERMAL POWER > P-6 and < P-10,~~ two Intermediate Range Neutron Flux channel~~s~~ inoperable. {Required}	F ~~G~~.1 Suspend operations involving positive reactivity additions.	Immediately	T.1 CLB.1
		AND		
		F ~~G~~.2 Reduce THERMAL POWER to < P-6.	2 hours	
	~~H. THERMAL POWER < P-6, one or two Intermediate Range Neutron Flux channels inoperable.~~	~~H.1 Restore channel(s) to OPERABLE status.~~	~~Prior to increasing THERMAL POWER to > P-6~~	T.1
	~~I. One Source Range Neutron Flux channel inoperable.~~	~~I.1 Suspend operations involving positive reactivity additions.~~	~~Immediately~~	CLB.1
⟨Doc A.7⟩	G ~~J~~. Two Source Range Neutron Flux channel~~s~~ inoperable. {Required}	G ~~J~~.1 Open RTBs. {Reactor Trip Breakers (RTBs)}	Immediately	CLB.1 T.1
	~~K. One Source Range Neutron Flux channel inoperable.~~	~~K.1 Restore channel to OPERABLE status.~~	~~48 hours~~	CLB.1
		~~OR~~		
	Insert: 3.3-4-01	~~K.2 Open RTBs.~~	~~49 hours~~	T.1

(continued)

INSERT 3.3-4-01: (This Insert Not Used)

	K.2.1 Initiate action to fully insert all rods. __AND__ K.2.2 Place the Rod control System in a condition incapable of rod withdrawal.	48 hours 49 hours

T.1

CLB.1

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
~~L~~. ~~Required Source Range Neutron Flux channel[(s)] inoperable.~~	~~L~~.1	~~Suspend operations involving positive reactivity additions.~~	~~Immediately~~
	~~AND~~		
	~~L~~.2	~~Close unborated water source isolation valves.~~	~~1 hour~~
	~~AND~~		
	~~L~~.3	~~Perform SR 3.1.1.1.~~	~~1 hour~~ ~~AND~~ ~~Once per 12 hours thereafter~~
Ⓗ ~~M~~. One channel inoperable.	-------------NOTE------------- The inoperable channel may be bypassed for up to ④ hours ⑧ for surveillance testing of other channels. -------------------------------		
	~~M~~.1 Ⓗ	Place channel in trip.	6 hours
	OR		
	~~M~~.2 Ⓗ	Reduce THERMAL POWER to < P-7.	12 hours

(T.1)

〈DOC A.10〉
〈DOC A.12〉
〈DOC A.13〉
〈DOC A.14〉
〈DOC A.16〉
〈DOC A.17〉
〈DOC A.18〉
〈3.5.4〉

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
~~N. One Reactor Coolant Flow - Low (Single Loop) channel inoperable.~~	~~------------NOTE------------ The inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels. ----------------------------~~		
	~~N.1~~	~~Place channel in trip.~~	~~6 hours~~
	~~OR~~		
	~~N.2~~	~~Reduce THERMAL POWER to < P-8.~~	~~10 hours~~
Ⓘ ~~O~~. One Reactor Coolant Pump Breaker Position channel inoperable.	------------NOTE------------ The inoperable channel may be bypassed for up to ④ ⑧ hours for surveillance testing of other channels. ----------------------------		
	~~O~~.1 Ⓘ	Restore channel to OPERABLE status.	6 hours
	OR		
	~~O~~.2 Ⓘ	Reduce THERMAL POWER to < P-8.	10 hours

(T.2)

<Doc A.15>
<3.5.4>

(continued)

ACTIONS (continued)

	CONDITION	REQUIRED ACTION		COMPLETION TIME
<DOC A.21>	J ~~P~~. One Turbine Trip channel inoperable.	------------NOTE------------ The inoperable channel may be bypassed for up to ~~(4)~~ 8 hours for surveillance testing of other channels. ----------------------------		
		J ~~P~~.1	Place channel in trip.	6 hours
		OR		
		J ~~P~~.2	Reduce THERMAL POWER to < ~~[P-9]~~ P-8.	10 hours
<DOC A.22> <DOC A.25>	K ~~Q~~. One train inoperable.	------------NOTE------------ One train may be bypassed for up to ~~[4]~~ 8 hours for surveillance testing provided the other train is OPERABLE. ----------------------------		
		K ~~Q~~.1	Restore train to OPERABLE status.	6 hours
		OR		
		K ~~Q~~.2	Be in MODE 3.	12 hours

R.1
Amendment 185

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
〈DOC A.23〉 Ⓛ ~~R~~. One RTB train inoperable.	------------NOTES------------ 1. One train may be bypassed for up to 2 hours for surveillance testing, provided the other train is OPERABLE. 2. One RTB may be bypassed for up to 2 hours for maintenance on undervoltage or shunt trip mechanisms, provided the other train is OPERABLE. ----------------------------	
	~~R~~.1 Ⓛ Restore train to OPERABLE status.	1 hour
	OR	
	~~R~~.2 Ⓛ Be in MODE 3.	7 hours
〈DOC A.26〉 〈DOC A.29〉 Ⓜ ~~S~~. One channel inoperable. {or more channels}	~~S~~.1 Ⓜ Verify interlock is in required state for existing unit conditions.	1 hour
	OR	
	~~S~~.2 Ⓜ Be in MODE 3.	7 hours

R-1

(continued)

ACTIONS (continued)

	CONDITION	REQUIRED ACTION	COMPLETION TIME	
⟨DOC A.27⟩ ⟨DOC A.28⟩ ⟨DOC A.30⟩	N ~~T~~. One channel inoperable. or more channels	~~T~~.1 N Verify interlock is in required state for existing unit conditions.	1 hour	T.1
		OR		
		~~T~~.2 N Be in MODE 2.	7 hours	
⟨DOC A.24⟩ ⟨DOC M.6⟩ ⟨T 3.5-2, Note ***⟩	O ~~U~~. One trip mechanism inoperable for one RTB.	O ~~U~~.1 Restore inoperable trip mechanism to OPERABLE status.	48 hours	
		OR		
		~~U~~.2~~.1~~ O Be in MODE 3.	54 hours	
		~~AND~~		
		~~U.2.2 Open RTB.~~	~~55 hours~~	T.1
	~~V. Two RTS trains inoperable.~~	~~V.1 Enter LCO 3.0.3.~~	~~Immediately~~	T.1

SURVEILLANCE REQUIREMENTS

<4.1.A>
<4.1.B>

-----------------------------------NOTE-----------------------------------
Refer to Table 3.3.1-1 to determine which SRs apply for each RTS Function.

	SURVEILLANCE	FREQUENCY
T4.1-1, Column "Check"	SR 3.3.1.1 Perform CHANNEL CHECK.	12 hours
<DOC A.4.d> <Doc A.4.d> <T 4.1-1, #1> <Doc A.4>	SR 3.3.1.2 ------------------NOTES------------------ 1. Adjust NIS channel if absolute difference is > 2%. 2. Not required to be performed until 24 [12] hours after THERMAL POWER is ≥ 15% RTP. -- Compare results of calorimetric heat balance calculation to Nuclear Instrumentation System (NIS) channel output.	24 hours
<3.11.B> <Doc A.8> <Doc L.5>	SR 3.3.1.3 ------------------NOTES------------------ 1. Adjust NIS channel if absolute difference is ≥ 3%. 2. Insert 3.3-10-01 ~~Not required to be performed until [24] hours after THERMAL POWER is ≥ [15]% RTP~~ -- Compare results of the incore detector measurements to NIS AFD.	31 effective full power days (EFPD)

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT 3.3-10-01:

Only required to be performed when THERMAL POWER is > 90% RTP. ⓒLB.2

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE		FREQUENCY	
<CTS>				
<DOC 23> <DOC 24>	SR 3.3.1.4	-------------------NOTE------------------- This Surveillance must be performed on the reactor trip bypass breaker prior to placing the bypass breaker in service. -- Perform TADOT.	31 days on a STAGGERED TEST BASIS	
<DOC A25>	SR 3.3.1.5	Perform ACTUATION LOGIC TEST.	31 days on a STAGGERED TEST BASIS	
<3.11.B>	SR 3.3.1.6 Insert: 3.3-11-01	-------------------NOTE------------------- ~~Not required to be performed until [24] hours after THERMAL POWER is ≥ 50% RTP~~ -- Calibrate excore channels to agree with incore detector measurements.	31 [92] EFPD	CLB.
<DOC A.4> <DOC A.7> <DOC 12> <DOC A 8> <DOC 13> <DOC A 9> <DOC 14> <DOC 10> <DOC 19> <DOC 11> <Doc A 40>	SR 3.3.1.7	-------------------NOTE------------------- Not required to be performed for source range instrumentation prior to entering MODE 3 from MODE 2 until 4 hours after entry into MODE 3. -- Perform COT.	[92] days	R.1

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT 3.3-11-01:

Only required to be performed when THERMAL POWER is > 90% RTP.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.1.8	-------------------NOTE------------------- This Surveillance shall include verification that interlocks P-6 and P-10 are in their required state for existing unit conditions. -- Perform COT.	-----NOTE----- Only required when not performed within previous [92] days -------------- Prior to reactor startup **AND** Twelve Four hours after reducing power below P-10 for power and intermediate instrumentation **AND** Four hours after reducing power below P-6 for source range instrumentation **AND** Every 92 days thereafter

<DOC L.4>
<DOC A.5>
<DOC A.6>
<DOC A.7>

T.3 R.1

R.1

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<DOC A.17> <DOC A.18> SR 3.3.1.9 --------------------NOTE-------------------- Verification of setpoint is not required. -- Perform TADOT.	[92] days
<DOC A.17> <DOC A.18> <DOC A.20> <DOC A.21> SR 3.3.1.10 --------------------NOTE-------------------- This Surveillance shall include verification that the time constants are adjusted to the prescribed values. -- Perform CHANNEL CALIBRATION.	Insert 3.3-13-04 ~~[18] months~~ CLB.
<DOC A.4> <DOC A.5> <DOC 26> <DOC A.6> <DOC 27> <DOC A.7> <DOC 28> <DOC A.30> <DOC A.29> SR 3.3.1.11 --------------------NOTE-------------------- Neutron detectors are excluded from CHANNEL CALIBRATION. -- Perform CHANNEL CALIBRATION.	24 [18] months
<DOC A.8> <DOC A.9> SR 3.3.1.12 --------------------NOTE-------------------- Insert: 3.3-13-02 ~~This Surveillance shall include verification of Reactor Coolant System resistance temperature detector bypass loop flow rate.~~ -- Perform CHANNEL CALIBRATION.	24 [18] months
DOC 26 DOC 27 <DOC 28> <[illegible]> <DOC A.26> <DOC 27> <DOC A.27> <DOC 28> <DOC A.28> SR 3.3.1.13 Perform COT.	24 18 months

(continued)

INSERT 3.3-13-01:

24 months

AND

18 months for Function 11

INSERT 3.3-13-02:

This Surveillance shall include verification that the electronic dynamic compensation time constants are set at the required values.

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE		FREQUENCY	
⟨DOC A.3⟩ ⟨T4.1-1, #39, #40⟩ ⟨DOC 15⟩ ⟨DOC 16⟩ ⟨DOC A.22⟩	SR 3.3.1.14	-------------------NOTE------------------- Verification of setpoint is not required. -- Perform TADOT.	[~~18~~] 24 months	
⟨DOC A.21⟩ ⟨DOC M.8⟩	SR 3.3.1.15	-------------------NOTE------------------- Verification of setpoint is not required. -- Perform TADOT.	24 months ~~-----NOTE-----~~ ~~Only required when not performed within previous 31 days~~ ~~--------------~~ ~~Prior to reactor startup~~	CLE 1
	~~SR 3.3.1.16~~	~~-------------------NOTE-------------------~~ ~~Neutron detectors are excluded from response time testing.~~ ~~--~~ ~~Verify RTS RESPONSE TIME is within limits.~~	~~[18] months on a STAGGERED TEST BASIS~~	CLB.1

Table 3.3.1-1 (page 1 of 8)
Reactor Trip System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	~~TRIP SETPOINT$^{(a)}$~~	
⟨DOC A.3⟩ ⟨DOC M.2⟩ ⟨DOC M.3⟩	1. Manual Reactor Trip	1,2	2	B	SR 3.3.1.14	NA	NA	
		ⓐ $3^{(\cancel{b})}$, $4^{(\cancel{b})}$, $5^{(\cancel{b})}$	2	C	SR 3.3.1.14	NA	~~NA~~	
	2. Power Range Neutron Flux							
⟨DOC A.4⟩	a. High	1,2	4	D	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.7 SR 3.3.1.11 ~~SR 3.3.1.16~~	≤ ~~[111.2]~~ (109)% RTP	~~≤ [109]% RTP~~	
⟨DOC A.5⟩	b. Low	ⓑ $1^{(\cancel{c})}$,2	4	E	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11 ~~SR 3.3.1.16~~	≤ ~~[27.2]~~ (25)% RTP	~~≤ [25]% RTP~~	
	~~3. Power Range Neutron Flux Rate~~							
	~~a. High Positive Rate~~	~~1,2~~	~~4~~	~~E~~	~~SR 3.3.1.7 SR 3.3.1.11~~	~~≤ [6.8]% RTP with time constant ≥ [2] sec~~	~~≤ [5]% RTP with time constant ≥ [2] sec~~	
	~~b. High Negative Rate~~	~~1,2~~	~~4~~	~~E~~	~~SR 3.3.1.7 SR 3.3.1.11 SR 3.3.1.16~~	~~≤ [6.8]% RTP with time constant ≥ [2] sec~~	~~≤ [5]% RTP with time constant ≥ [2] sec~~	
⟨DOC A.6⟩	~~4~~. ③ Intermediate Range Neutron Flux	ⓑ $1^{(\cancel{c})}$, $2^{(\cancel{d})}$ ⓒ	~~②~~ ①	F,~~G~~	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11	~~≤ [31]% RTP~~ (NA)	~~≤ [25]% RTP~~	CLB.1
		~~$2^{(e)}$~~	~~2~~	~~H~~	~~SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11~~	~~≤ [31]% RTP~~	~~≤ [25]% RTP~~	T.1

(continued)

~~(a) Reviewer's Note: Unit specific implementations may contain only Allowable Value depending on Setpoint Study methodology used by the unit.~~ PA.1

ⓐ ~~(b)~~ With ~~Reactor Trip Breakers (RTBs) Closed and~~ Rod Control System capable of rod withdrawal. Insert: 3.3-15-01 T.1

ⓑ ~~(c)~~ Below the P-10 (Power Range Neutron Flux) interlocks.

ⓒ ~~(d)~~ Above the P-6 (Intermediate Range Neutron Flux) interlocks.

~~(e) Below the P-6 (Intermediate Range Neutron Flux) interlocks.~~ T.1

Only 3 channels [illegible]

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT 3.3-15-01:

or one or more rods not fully inserted.

Table 3.3.1-1 (page 2 of 8)
Reactor Trip System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	~~TRIP SETPOINT~~$^{(a)}$	
⟨DOC A.7⟩	④ ~~5.~~ Source Range Neutron Flux	ⓓ $2^{(\cancel{e})}$	① ~~2~~	Ⓖ ~~I, J~~	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11 ~~SR 3.3.1.16~~	~~≤ [1.4 E5] cps~~ NA	~~≤ [1.0 E5] cps~~	CLB.1
⟨DOC M.1⟩		ⓐ $3^{(b)}, 4^{(b)}, 5^{(b)}$	① ~~2~~	Ⓖ ~~J, K~~	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.11 ~~SR 3.3.1.16~~	~~≤ [1.4 E5] cps~~	~~≤ [1.0 E5] cps~~	
		~~$3^{(f)}, 4^{(f)}, 5^{(f)}$~~	~~[1]~~	~~L~~	~~SR 3.3.1.1~~ ~~SR 3.3.1.11~~	~~N/A~~	~~N/A~~	
⟨DOC A.8⟩	⑤ ~~6.~~ Overtemperature ΔT	1,2	~~[~~4~~]~~	E	SR 3.3.1.1 SR 3.3.1.3 SR 3.3.1.6 SR 3.3.1.7 SR 3.3.1.12 ~~SR 3.3.1.16~~	Refer to Note 1 ~~(Page 3.3-21)~~	~~Refer to Note 1 (Page 3.3-21)~~	
⟨DOC A.9⟩	⑥ ~~7.~~ Overpower ΔT	1,2	~~[~~4~~]~~	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.12 ~~SR 3.3.1.16~~	Refer to Note 2 ~~(Page 3.3-22)~~	~~Refer to Note 2 (Page 3.3-22)~~	

(continued)

~~(a) Reviewer's Note: Unit specific implementations may contain only Allowable Value depending on Setpoint Study methodology used by the unit.~~ PA 1

ⓐ ~~(b)~~ With ~~RTBs closed and~~ Rod Control System capable of rod withdrawal. Insert: 3.3-16-01 T.1

ⓓ ~~(e)~~ Below the P-6 (Intermediate Range Neutron Flux) interlocks.

~~(f) With the RTBs open. In this condition, source range Function does not provide reactor trip but does provide [input to the Boron Dilution Protection System (LCO 3.3.9), and] indication.~~ T.1

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT 3.3-16-01:

or one or more rods not fully inserted.

Table 3.3.1-1 (page 3 of 8)
Reactor Trip System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	~~TRIP SETPOINT(a)~~	
	~~8.~~ (7) Pressurizer Pressure							
⟨DOC A.10⟩	a. Low	1~~(g)~~ (e)	~~[4]~~ (4)	(H) ~~M~~	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 ~~SR 3.3.1.16~~	≥ ~~[1886]~~ 1749 psig	~~≥ [1900] psig~~	
⟨DOC A.11⟩	b. High	1,2	~~[4]~~ (3)	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 ~~SR 3.3.1.16~~	≤ ~~[2396]~~ 2408.24 psig	~~≤ [2385] psig~~	
⟨DOC A.12⟩	(8) ~~9.~~ Pressurizer Water Level – High	1~~(g)~~ (e)	3	(H) ~~M~~	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10	≤ ~~[93.8]~~ 97.47 %	~~≤ [92]%~~	
⟨DOC A.13⟩	(9) ~~10.~~ Reactor Coolant Flow – Low	1(e)	↑	(H)	↑	↑ 90		(T.2)
	a. ~~Single Loop~~	~~1(h)~~	3 per loop	~~N~~	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 ~~SR 3.3.1.16~~	≥ ~~[89.2]~~ 89 %	~~≥ [90]%~~	R.1
⟨DOC A.14⟩	~~b. Two Loops~~	~~1(i)~~	~~3 per loop~~	~~M~~	~~SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16~~	~~≥ [89.2]%~~	~~≥ [90]%~~	(T.2)

(continued)

~~(a) Reviewer's Note: Unit specific implementations may contain only Allowable Value depending on Setpoint Study methodology used by the unit.~~ (T.1)

(e) ~~(g)~~ Above the P-7 (Low Power Reactor Trips Block) interlock.

~~(h) Above the P-8 (Power Range Neutron Flux) interlock.~~

~~(i) Above the P-7 (Low Power Reactor Trips Block) interlock and below the P-8 (Power Range Neutron Flux) interlock.~~ (T.2)

(f) Separate Condition entry is allowed for each loop. R.1

Table 3.3.1-1 (page 4 of 8)
Reactor Trip System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	~~TRIP SETPOINT(a)~~	
	~~11.~~ ⑩ Reactor Coolant Pump (RCP) Breaker Position							
⟨DOC A.15⟩	a. Single Loop	1~~(h)~~ (f)	1 per RCP	(I) ~~J~~	SR 3.3.1.14	NA	~~NA~~	
⟨DOC A.16⟩	b. Two Loops	1~~(i)~~ (g)	1 per RCP	(H) ~~K~~	SR 3.3.1.14	NA	~~NA~~	
⟨DOC A.17⟩	~~12.~~ ⑪ Undervoltage RCPs (6.9 kV bus)	1~~(g)~~ (e)	① ~~[3]~~ per bus	(H) ~~K~~	SR 3.3.1.9 SR 3.3.1.10 ~~SR 3.3.1.16~~	NC ≥ ~~[4760] V~~ 68.37%	~~≥ [4830] V~~	R.1
⟨DOC A.18⟩	~~13.~~ ⑫ Underfrequency RCPs (6.9 kV bus)	1~~(g)~~ (e)	① ~~[3]~~ per bus	(H) ~~M~~	SR 3.3.1.9 SR 3.3.1.10 ~~SR 3.3.1.16~~	≥ ~~[57.1]~~ Hz 57.22	~~≥ [57.5] Hz~~	
⟨DOC A.19⟩	~~14.~~ ⑬ Steam Generator (SG) Water Level - Low Low	1,2 ~~(k)~~	③ ~~[4]~~ per SG(k)	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 ~~SR 3.3.1.16~~	≥ ~~[30.4]~~% ~~3.54~~ 4.0	~~≥ [32.3]%~~	R.1
⟨DOC A.20⟩	~~15.~~ ⑭ SG Water Level - Low	1,2	2 per SG	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 ~~SR 3.3.1.16~~	~~≥ [30.4]%~~ NA	~~≥ [32.3]%~~	R.1
	Coincident with Steam Flow/ Feedwater Flow Mismatch	1,2	2 per SG	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 ~~SR 3.3.1~~.16	~~≤ [42.5]% full steam flow at RTP~~	~~≤ [40]% full steam flow at RTP~~	R.1

(continued)

~~(a) Reviewer's Note: Unit specific implementations may contain only Allowable Value depending on Setpoint Study methodology used by the unit.~~

ⓔ ~~(g)~~ Above the P-7 (Low Power Reactor Trips Block) interlock.

ⓕ ~~(h)~~ Above the P-8 (Power Range Neutron Flux) interlock.

ⓖ ~~(i)~~ Above the P-7 (Low Power Reactor Trips Block) interlock and below the P-8 (Power Range Neutron Flux) interlock.

~~(k) Separate Condition entry is allowed for each SG~~ R.1

Table 3.3.1-1 (page 5 of 8)
Reactor Trip System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	TRIP SETPOINT(a)
<DOC A.21>	~~16.~~ 15 Turbine Trip – ~~a.~~ ~~Low Fluid~~ Auto-Stop Oil Pressure	1~~(f)~~ h	3	J	SR 3.3.1.10 SR 3.3.1.15	≥ ~~[750]~~ 46 psig NF	≥ [800] psig
	~~b. Turbine Stop Valve Closure~~	~~1(f)~~	~~4~~		~~SR 3.3.1.10~~ ~~SR 3.3.1.15~~	~~≥ [1]% open~~	≥ [1]% open
<DOC.A 22>	~~17.~~ 16 Safety Injection (SI) Input from Engineered Safety Feature Actuation System (ESFAS)	1,2	2 trains	K	SR 3.3.1.14	NA	NA
	~~18.~~ 17 Reactor Trip System Interlocks						
<DOC A.26>	a. Intermediate Range Neutron Flux, P-6	2~~(e)~~ d	~~2~~ 2 Trains	M	SR 3.3.1.11 SR 3.3.1.13	≥ ~~[6E-11]~~ 3.1 E-11 amp	≥ [1E-10] amp
<DOC A.27>	b. Low Power Reactor Trips Block, P-7	1	1 per train	N	SR 3.3.1.11 SR 3.3.1.13	NA	NA
<DOC A.28>	c. Power Range Neutron Flux, P-8	1	4	N	SR 3.3.1.11 SR 3.3.1.13	~~≤ [50.2]% RTP~~ NA	≤ [48]% RTP
	~~d. Power Range Neutron Flux, P-9~~	~~1~~	~~4~~		~~SR 3.3.1.11~~ ~~SR 3.3.1.13~~	~~≤ [52.2]% RTP~~	≤ [50]% RTP
<DOC A.29>	e. d Power Range Neutron Flux, P-10	1,2	4	M	SR 3.3.1.11 SR 3.3.1.13	~~≥ [7.8]% RTP and ≤ [12.2]% RTP~~ NA	≥ [10]% RTP
<DOC A.30>	~~f.~~ e Turbine ~~Impulse~~ First Stage Pressure, ~~P-13~~ P-7 Input	1	2	N	~~SR 3.3.1.1~~ SR 3.3.1.10 SR 3.3.1.13	~~≤ [12.2]% turbine power~~ NA	≤ [10]% turbine power

R.1

(continued)

~~(a) Reviewer's Note: Unit specific implementations may contain only Allowable Value depending on Setpoint Study methodology used by the unit.~~

d ~~(e)~~ Below the P-6 (Intermediate-Range Neutron Flux) interlocks.

h ~~(f)~~ Above ~~the P-9 (Power Range Neutron Flux) interlock~~ Insert: 3.3-19-01

R.1

INSERT: 3.3-19-01

Above the P-8 (Power Range Neutron Flux) interlock.

A192

Table 3.3.1-1 (page 6 of 8)
Reactor Trip System Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	~~TRIP SETPOINT(a)~~
⟨DOC A.23⟩	~~19.~~ ⑱ Reactor Trip Breakers~~(c)~~ (RTBs) (i)	1,2	2 trains	Ⓛ	SR 3.3.1.4	NA	~~NA~~
		ⓐ $3^{(\cancel{b})}, 4^{(\cancel{b})}, 5^{(\cancel{b})}$	2 trains	C	SR 3.3.1.4	NA	NA
⟨DOC A.24⟩	~~20.~~ ⑲ Reactor Trip Breaker Undervoltage and Shunt Trip Mechanisms	1,2	1 each per RTB	Ⓞ	SR 3.3.1.4	NA	~~NA~~
		ⓐ $3^{(\cancel{b})}, 4^{(\cancel{b})}, 5^{(\cancel{b})}$	1 each per RTB	C	SR 3.3.1.4	NA	~~NA~~
⟨DOC A.25⟩	~~21.~~ ⑳ Automatic Trip Logic	ⓐ 1,2	2 trains	Ⓚ	SR 3.3.1.5	NA	NA
		$3^{(\cancel{b})}, 4^{(\cancel{b})}, 5^{(\cancel{b})}$	2 trains	C	SR 3.3.1.5	NA	~~NA~~

~~(a) Reviewer's Note: Unit specific implementations may contain only Allowable Value depending on Setpoint Study methodology used by the unit.~~

ⓐ ~~(b)~~ With ~~RTBs closed and~~ Rod Control System capable of rod withdrawal. Insert 3.3-20-01

(i) ~~(c)~~ Including any reactor trip bypass breakers that are racked in and closed for bypassing an RTB.

T.1

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT 3.3-20-01:

or one or more rods not fully inserted.

Table 3.3.1-1 (page 7 of 8)
Reactor Trip System Instrumentation

<CTS>

<3.2.1.B4>

{Allowable Value}

Note 1: Overtemperature ΔT

The Overtemperature ΔT Function Allowable Value shall not exceed the following Trip Setpoint ~~by more than [3.8]% of ΔT span~~

$$\Delta T\frac{(1+\tau_1 s)}{(1+\tau_2 s)}\left(\frac{1}{1+\tau_3 s}\right)\le \Delta T_0\left\{K_1-K_2\frac{(1+\tau_4 s)}{(1+\tau_5 s)}\left[T\frac{1}{(1+\tau_6 s)}-T'\right]+K_3(P-P')-f_1(\Delta I)\right\}$$

~~Where: ΔT is measured RCS ΔT, °F.~~
~~ΔT_0 is the indicated ΔT at RTP, °F.~~
~~s is the Laplace transform operator, sec^{-1}.~~
~~T is the measured RCS average temperature, °F.~~
~~T' is the nominal T_{avg} at RTP, ≤ [588]°F.~~

~~P is the measured pressurizer pressure, psig~~
~~P' is the nominal RCS operating pressure, ≤ [2235] psig~~

~~$K_1 \le [1.09]$ $K_2 \ge [0.0138]/°F$ $K_3 = [0.000671]/psig$~~
~~$\tau_1 \ge [\ 8\ ]$ sec $\tau_2 \le [\ 3\ ]$ sec $\tau_3 \le [\ 2\ ]$ sec~~
~~$\tau_4 \ge [\ 33\ ]$ sec $\tau_5 \le [\ 4\ ]$ sec $\tau_6 \le [\ 2\ ]$ sec~~

~~$f_1(\Delta I) = 1.26\{35 + (q_t - q_b)\}$ when $q_t - q_b \le -[35]\%$ RTP~~
~~0% of RTP when $-[35]\%$ RTP $< q_t - q_b \le [7]\%$ RTP~~
~~$-1.05\{(q_t - q_b) - 7\}$ when $q_t - q_b > [7]\%$ RTP~~

~~Where q_t and q_b are percent RTP in the upper and lower halves of the core, respectively, and $q_t + q_b$ is the total THERMAL POWER in percent RTP.~~

Insert:
3.3-21-01

INSERT 3.3-21-01:

$$\Delta T \leq \Delta T_o [K_1 - K_2 \{(1 + \tau_1 s)/(1 + \tau_2 s)\}(T_{avg} - T') + K_3 (P - P') - f(\Delta I)]$$

Where:

$K_1 \leq 1.285$ $K_2 = 0.0273$ $K_3 = 0.0013$

$\tau_1 \geq 25$ seconds $\tau_2 \leq 3$ seconds

ΔT_o ≤ Measured full power ΔT for the channel being calibrated, °F.

T_{avg} = Average Temperature for the channel being calibrated, °F (input from instrument racks)

s = Laplace transform operator, seconds^{-1}

T' = Measured full power T_{avg} for the channel being calibrated, °F

P = Pressurizer pressure, psig (input from instrument racks)

P' = 2235 psig (i.e., nominal pressurizer pressure at rated power)

K_1 is a constant which defines the overtemperature ΔT trip margin during steady state operation if the temperature, pressure, and $f(\Delta I)$ terms are zero.

K_2 is a constant which defines the dependence of the overtemperature ΔT setpoint to T_{avg}.

K_3 is a constant which defines the dependence of the overtemperature ΔT setpoint to pressurizer pressure.

ΔI = $q_t - q_b$, where q_t and q_b are the percent power in the top and bottom halves of the core respectively, and $q_t + q_b$ is total core power in percent of RTP.

$f(\Delta I)$ = a function of the indicated difference between top and bottom detectors of the power-range nuclear ion chambers; with gains to be selected based on measured instrument response during plant startup tests, where q_t and q_b are defined above such that:

(a) for $q_t - q_b$ between -15.75% and +6.9%, $f(\Delta I)=0$.

(b) for each percent that the magnitude of $q_t - q_b$ exceeds +6.9%, the ΔT trip setpoint shall be automatically reduced by an equivalent of 3.333% of RTP.

(c) for each percent that the magnitude of $q_t - q_b$ is more negative than -15.75%, the ΔT trip setpoint shall be automatically reduced by an equivalent of 4.000% of RTP.

Table 3.3.1-1 (page 8 of 8)
Reactor Trip System Instrumentation

Note 2: Overpower ΔT

The Overpower ΔT Function Allowable Value shall not exceed the following ~~Trip Setpoint by more than [3]% of ΔT span~~.

$$\Delta T \frac{(1+\tau_1 s)}{(1+\tau_2 s)} \left(\frac{1}{1+\tau_3 s}\right) \le \Delta T_0 \left\{ K_4 - K_5 \frac{\tau_7 s}{1+\tau_7 s} \left(\frac{1}{1+\tau_6 s}\right) T - K_6 \left[T \frac{1}{1+\tau_6 s} - T'' \right] - f_2(\Delta I) \right\}$$

~~Where: ΔT is measured RCS ΔT, °F.~~
~~ΔT_0 is the indicated ΔT at RTP, °F.~~
~~s is the Laplace transform operator, sec^{-1}.~~
~~T is the measured RCS average temperature, °F.~~
~~T" is the nominal T_{avg} at RTP, ≤ [588]°F.~~

~~$K_4 \le [1.09]$~~
~~$K_5 \ge [0.02]$/°F for increasing T_{avg}~~
~~[0]/°F for decreasing T_{avg}~~
~~$K_6 \ge [0.00128]$/°F when T > T"~~
~~[0]/°F when T ≤ T"~~

~~$\tau_1 \ge [8]$ sec~~
~~$\tau_2 \le [3]$ sec~~
~~$\tau_3 \le [2]$ sec~~
~~$\tau_6 \le [2]$ sec~~
~~$\tau_7 \ge [10]$ sec~~

~~$f_2(\Delta I)$ = 0% RTP for all ΔI.~~

Insert:
3.3-22-01

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT 3.3-22-01:

$$\Delta T \leq \Delta T_o (K_4 - K_5 (dTavg/dt) - K_6(T_{avg} - T'))$$

Where:

K_4 $\leq$ 1.154

K_5 = 0 for decreasing average temperature; and
$\geq$ 0.175 sec/°F for increasing average temperature

K_6 = 0 for $T \leq T'$; and
$\geq$ 0.00134 for $T > T'$

ΔT_o $\leq$ measured full power ΔT for the channel being calibrated. °F

T_{avg} = measured average temperature for the channel being calibrated. °F (input from instrument racks)

T' = measured full power T_{avg} for the channel being calibrated. °F (can be set no higher than 570.3 °F)

K_4 is a constant which defines the overpower ΔT trip margin during steady state operation if the temperature term is zero.

K_5 is a constant determined by dynamic considerations to compensate for piping delays from the core to the loop temperature detectors; it represents the combination of the equipment static gain setting and the time constant setting.

K_6 is a constant which defines the dependence of the overpower ΔT setpoint to T_{avg}.

dTavg/dt is the rate of change of T_{avg}

(all locations)

Protection System (RPS)

B 3.3 INSTRUMENTATION

B 3.3.1 Reactor ~~Trip System (RTS)~~ Instrumentation

RPS Typical

BASES

BACKGROUND The RTS initiates a unit shutdown, based on the values of selected unit parameters, to protect against violating the core fuel design limits and Reactor Coolant System (RCS) pressure boundary during anticipated operational occurrences (AOOs) and to assist the Engineered Safety Features (ESF) Systems in mitigating accidents.

The protection and monitoring systems have been designed to assure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RTS, as well as specifying LCOs on other reactor system parameters and equipment performance.

Allowable Value

The LSSS, defined in this specification as the ~~[Trip Setpoints]~~, in conjunction with the LCOs, establish the threshold for protective system action to prevent exceeding acceptable limits during Design Basis Accidents (DBAs).

During AOOs, which are those events expected to occur one or more times during the unit life, the acceptable limits are:

1. The Departure from Nucleate Boiling Ratio (DNBR) shall be maintained above the Safety Limit (SL) value to prevent departure from nucleate boiling (DNB);
2. Fuel centerline melt shall not occur; and
3. The RCS pressure SL of ~~2750 psia~~ shall not be exceeded.

2735 psig

Operation within the SLs of Specification 2.0, "Safety Limits (SLs)," also maintains the above values and assures that offsite dose will be within the 10 CFR 50 and 10 CFR 100 criteria during AOOs.

Accidents are events that are analyzed even though they are not expected to occur during the unit life. The acceptable limit during accidents is that offsite dose shall be maintained within an acceptable fraction of 10 CFR 100 limits. Different accident categories are allowed a

(continued)

Typical

BASES

BACKGROUND (continued)

different fraction of these limits, based on probability of occurrence. Meeting the acceptable dose limit for an accident category is considered having acceptable consequences for that event.

as described in

The RTS instrumentation is segmented into four distinct but interconnected modules as ~~illustrated in Figure [ ]~~, FSAR, Chapter [7] (Ref. 1), and as identified below:

1. Field transmitters or process sensors: provide a measurable electronic signal based upon the physical characteristics of the parameter being measured;

2. Signal Process Control and Protection System, including Analog Protection System, Nuclear Instrumentation System (NIS), field contacts, and protection channel sets: provides signal conditioning, bistable setpoint comparison, process algorithm actuation, compatible electrical signal output to protection system devices, and control board/control room/miscellaneous indications;

(A)

R.1

RTS automatic initiation relay logic

3. ~~Solid State Protection System (SSPS)~~, including input, logic, and output ~~bays~~: initiates proper unit shutdown ~~and/or ESF actuation~~ in accordance with the defined logic, which is based on the bistable outputs from the signal process control and protection system; and

4. Reactor trip switchgear, including reactor trip breakers (RTBs) and bypass breakers: provides the means to interrupt power to the control rod drive mechanisms (CRDMs) and allows the rod cluster control assemblies (RCCAs), or "rods," to fall into the core and shut down the reactor. The bypass breakers allow testing of the RTBs at power.

Field Transmitters or Sensors

To meet the design demands for redundancy and reliability, more than one, and often as many as four, field transmitters or sensors are used to measure unit parameters. To account for the calibration tolerances and instrument drift, which are assumed to occur between calibrations, statistical allowances are provided in the ~~Trip Setpoint and~~ Allowable

(continued)

BASES

BACKGROUND

Field Transmitters or Sensors (continued)

Values. The OPERABILITY of each transmitter or sensor can be evaluated when its "as found" calibration data are compared against its documented ~~acceptance criteria~~.

allowable value

Signal Process Control and Protection System

to ensure that actuation will occur within the limits assumed in the accident analysis (Ref. 3).

RPS relay logic

the actuation logic

Generally, three or four channels of process control equipment are used for the signal processing of unit parameters measured by the field instruments. The process control equipment provides signal conditioning, comparable output signals for instruments located on the main control board, and comparison of measured input signals with setpoints established ~~by safety analyses. These setpoints are defined in FSAR, Chapter [7] (Ref. 1), Chapter [6] (Ref. 2), and Chapter [15] (Ref. 3).~~ If the measured value of a unit parameter exceeds the predetermined setpoint, an output from a bistable is forwarded to the ~~SSPS for decision evaluation~~. Channel separation is maintained up to and through the ~~input bays~~. However, not all unit parameters require four channels of sensor measurement and signal processing. Some unit parameters provide input only to the SSPS, while others provide input to the SSPS, the main control board, the unit computer, and one or more control systems.

Generally, if a parameter is used only for input to the protection circuits, three channels with a two-out-of-three logic are sufficient to provide the required reliability and redundancy. If one channel fails in a direction that would not result in a partial Function trip, the Function is still OPERABLE with a two-out-of-two logic. If one channel fails, such that a partial Function trip occurs, a trip will not occur and the Function is still OPERABLE with a one-out-of-two logic.

RPS relay logic

Generally, if a parameter is used for input to the SSPS and a control function, four channels with a two-out-of-four logic are sufficient to provide the required reliability and redundancy. The circuit must be able to withstand both an input failure to the control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. Again, a single failure will neither cause nor

(continued)

BASES

BACKGROUND Signal Process Control and Protection System (continued)

prevent the protection function actuation. These requirements are described in IEEE-279-~~1971~~ 1968 (Ref. 4). The actual number of channels required for each unit parameter is specified in Reference 1 and discussed later in these Technical Specification Bases.

Two logic channels are required to ensure no single random failure of a logic channel will disable the RTS. The logic channels are designed such that testing required while the reactor is at power may be accomplished without causing trip. ~~Provisions to allow removing logic channels from service during maintenance are unnecessary because of the logic system's designed reliability.~~

Trip Setpoints and Allowable Values

Insert: B3.3-4-01

~~The Trip Setpoints are the nominal values at which the bistables are set. Any bistable is considered to be properly adjusted when the "as left" value is within the band for CHANNEL CALIBRATION accuracy (i.e., ± rack calibration + comparator setting accuracy).~~

~~The Trip Setpoints used in the bistables are based on the analytical limits stated in Reference 1. The selection of these Trip Setpoints is such that adequate protection is provided when all sensor and processing time delays are taken into account. To allow for calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment errors for those RTS channels that must function in harsh environments as defined by 10 CFR 50.49 (Ref. 5), the Trip Setpoints and Allowable Values specified in Table 3.3.1-1 in the accompanying LCO are conservatively adjusted with respect to the analytical limits. A detailed description of the methodology used to calculate the Trip Setpoints, including their explicit uncertainties, is provided in the "RTS/ESFAS Setpoint Methodology Study" (Ref. 6). The actual nominal Trip Setpoint entered into the bistable is more conservative than that specified by the Allowable Value to account for changes in random measurement errors detectable by a COT. One example of such a change in measurement error is drift during the surveillance interval. If the measured setpoint does not exceed the Allowable Value, the bistable is considered OPERABLE.~~

(continued)

INSERT B 3.3-4-01:

The following describes the relationship between the safety limit, analytical limit, allowable value and channel component calibration acceptance criteria:

a. A Safety Limit (SL) is a limit on the combination of THERMAL POWER, RCS highest loop average temperature, and RCS pressure needed to protect the integrity of physical barriers that guard against the uncontrolled release of radioactivity (i.e., fuel, fuel cladding, RCS pressure boundary and containment). The safety limits are identified in Technical Specification 2.0, Safety Limits (SLs).

b. An Analytical Limit (AL) is the trip actuation point used as an input to the accident analyses presented in FSAR, Chapter 14 (Ref. 3). Analytical limits are developed from event analyses models which consider parameters such as process delays, rod insertion times, reactivity changes, instrument response times, etc. An analytical limit for a trip actuation point is established at a point that will ensure that a Safety Limit (SL) is not exceeded.

c. An Allowable Value (AV) is the limiting actuation point for the entire channel of a trip function that will ensure, within the required level of confidence, that sufficient allocation exists between this actual trip function actuation point and the analytical limit. The Allowable Value is more conservative than the Analytical Limit to account for instrument uncertainties that either are not present or are not measured during periodic testing. Channel uncertainties that either are not present or are not measured during periodic testing may include design basis accident temperature and radiation effects (Ref. 5) or process dependent effects. The channel allowable value for each RPS function is controlled by Technical Specifications and is listed in Table 3.3.1-1, Reactor Protection System Instrumentation.

d. Calibration acceptance criteria are established by plant administrative programs for the components of a channel (i.e., required sensor, alarm, interlock, display, and trip function). The calibration acceptance criteria are established to ensure, within the required level of confidence, that the Allowable Value for the entire channel will not be exceeded during the calibration interval.

A description of the methodology used to calculate the channel allowable values and calibration acceptance criteria is provided in References 6 and 8.

BASES

BACKGROUND

Trip Setpoints and Allowable Values (continued)

Setpoints in accordance with the Allowable Value ensure that SLs are not violated during AOOs (and that the consequences of DBAs will be acceptable, providing the unit is operated from within the LCOs at the onset of the AOO or DBA and the equipment functions as designed). ~~Note that in the accompanying LCO 3.3.1, the Trip Setpoints of Table 3.3.1-1 are the LSSS.~~

Relay logic protection system

Each channel of the ~~process control equipment~~ can be tested on line to verify that the signal or setpoint accuracy is within the specified allowance requirements of ~~Reference 2~~. Once a designated channel is taken out of service for testing, a simulated signal is injected in place of the field instrument signal. The process equipment for the channel in test is then tested, verified, and calibrated. SRs for the channels are specified in the SRs section.

Insert: B3.3-5-01

The ~~Trip Setpoints and~~ Allowable Values listed in Table 3.3.1-1~~,~~ are based on the methodology described in Reference 6, which incorporates all of the known uncertainties applicable for each channel. ~~The magnitudes of these uncertainties are factored into the determination of each Trip Setpoint.~~ All field sensors and signal processing equipment for these channels are assumed to operate within the allowances of these uncertainty magnitudes.

Insert: B3.3-5-02

Relay logic

~~Solid State~~ Protection System

Relay logic

~~The SSPS equipment~~ is used for the decision logic processing of outputs from the signal processing equipment bistables. To meet the redundancy requirements, two trains of SSPS, each performing the same functions, are provided. If one train is taken out of service for maintenance or test purposes, the second train will provide reactor trip and/or ESF actuation for the unit. If both trains are taken out of service or placed in test, a reactor trip will result. Each train is packaged in its own cabinet for physical and electrical separation to satisfy separation and independence requirements. The system has been designed to trip in the event of a loss of power, directing the unit to a safe shutdown condition.

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-5-01:

calculations performed in accordance with Reference 6 that are based on analytical limits consistent with Reference 3.

INSERT B 3.3-5-02:

and the Trip Setpoints calculated to ensure that Allowable Values are not exceeded during the calibration interval

BACKGROUND

Relay Logic

~~Solid State~~ Protection System (continued)

The ~~SSPS~~ performs the decision logic for actuating a reactor trip or ESF actuation, generates the electrical output signal that will initiate the required trip or actuation, and provides the status, permissive, and annunciator output signals to the ~~main~~ control room ~~of the unit~~.

The bistable outputs from the signal processing equipment are sensed by the SSPS equipment and combined into logic matrices that represent combinations indicative of various unit upset and accident transients. If a required logic matrix combination is completed, the system will initiate a reactor trip or send actuation signals via master and slave relays to those components whose aggregate Function best serves to alleviate the condition and restore the unit to a safe condition. Examples are given in the Applicable Safety Analyses, LCO, and Applicability sections of this Bases.

Reactor Trip ~~Switchgear~~ Breakers

The RTBs are in the electrical power supply line from the control rod drive motor generator set power supply to the CRDMs. Opening of the RTBs interrupts power to the CRDMs, which allows the shutdown rods and control rods to fall into the core by gravity. Each RTB is equipped with a bypass breaker to allow testing of the RTB while the unit is at power. During normal operation the output from the SSPS is a voltage signal that energizes the undervoltage coils in the RTBs and bypass breakers, if in use. When the required logic matrix combination is completed, the SSPS output voltage signal is removed, the undervoltage coils are de-energized, the breaker trip lever is actuated by the de-energized undervoltage coil, and the RTBs and bypass breakers are tripped open. This allows the shutdown rods and control rods to fall into the core. In addition to the de-energization of the undervoltage coils, each breaker is also equipped with a shunt trip device that is energized to trip the breaker open upon receipt of a reactor trip signal from the SSPS. Either the undervoltage coil or the shunt trip mechanism is sufficient by itself, thus providing a diverse trip mechanism.

reactor protection system

Insert:
B 3.3-6-01

The RPS decision logic ~~matrix~~ Functions are described in the functional diagrams included in Reference 2. In addition to

(continued)

INSERT B 3.3-6-01:

There are two reactor trip breakers in series so that opening either will interrupt power to the control rod drive mechanisms (CRDMs) and allow the rod cluster control assemblies (RCCAs), or "rods, " to fall into the core and shut down the reactor. Each reactor trip breaker has a parallel reactor trip bypass breaker that is normally open. This feature allows testing of the reactor trip breakers at power. A trip signal from RPS logic train A will trip reactor trip breaker A and reactor trip bypass breaker B; and, a trip signal from logic train B will trip reactor trip breaker B and reactor trip bypass breaker A. During normal operation, both reactor trip breakers are closed and both reactor trip bypass breakers are open. An interlock trips both reactor trip bypass breakers if an attempt is made to close a reactor trip bypass breaker when the other reactor trip bypass breaker is already closed.

A trip breaker train consists of both the reactor trip breaker and reactor trip bypass breaker associated with a single RPS logic train if the breaker is racked in, closed, and capable of supplying power to the CRD System. Thus, the train consists of the main breaker; or, the main breaker and bypass breaker associated with this same RPS logic train if both the breaker and bypass are racked in, closed, and capable of supplying power to the CRD System.

BASES

BACKGROUND

Reactor Trip Switchgear (continued)

protection or ESFAS trips

are described

¶1

RPS

the reactor ~~trip or ESF~~, ~~these diagrams also describe~~ the various "permissive interlocks" that are associated with unit conditions. ~~Each train has a built in testing device that can automatically test the decision logic matrix Functions and the actuation devices while the unit is at power.~~ When any one train is taken out of service for testing, the other train is capable of providing unit monitoring and protection until the testing has been completed. ~~The testing device is semiautomatic to minimize testing time.~~

Safety Limits (SLs)

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

Insert: B 3.3-7-01

Abnormal Operating Occurrences (AOOs)

The RTS functions to maintain the SLs during all AOOs and mitigates the consequences of DBAs in all MODES in which the ~~RTBs are closed~~.

Each of the analyzed accidents and transients can be detected by one or more RTS Functions. The accident analysis described in Reference 3 takes credit for most RTS trip Functions. RTS trip Functions not specifically credited in the accident analysis are qualitatively credited in the safety analysis and the NRC staff approved licensing basis ~~for the unit~~. These RTS trip Functions may provide protection for conditions that do not require dynamic transient analysis to demonstrate Function performance. They may also serve as backups to RTS trip Functions that were credited in the accident analysis.

The LCO requires all instrumentation performing an RTS Function, listed in Table 3.3.1-1 in the accompanying LCO, to be OPERABLE. Failure of any instrument renders the affected channel(s) inoperable and reduces the reliability of the affected Functions.

Generally,

Insert: B 3.3-7-02

The LCO generally requires OPERABILITY of four or three channels in each instrumentation Function, two channels of Manual Reactor Trip in each logic Function, and two trains in each Automatic Trip Logic Function. Four OPERABLE instrumentation channels in a two-out-of-four configuration are required when one RTS channel is also used as a control system input. This configuration accounts for the possibility of the shared channel failing in such a manner that it creates a transient that requires RTS action. In

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-7-01:

Rod Control system is capable of rod withdrawal or one or more rods not fully inserted.

INSERT B 3.3-7-02:

Isolation amplifiers prevent a control system failure from affecting the protection system (Ref. 1).

OPERABLE

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY
(continued)

this case, the RTS will still provide protection, even with random failure of one of the other three protection channels. Three operable instrumentation channels in a two-out-of-three configuration are generally required when there is no potential for control system and protection system interaction that could simultaneously create a need for RTS trip and disable one RTS channel. The two-out-of-three and two-out-of-four configurations allow one channel to be tripped during maintenance or testing without causing a reactor trip. Specific exceptions to the above general philosophy exist and are discussed below.

Reactor Trip System Functions

The safety analyses and OPERABILITY requirements applicable to each RTS Function are discussed below:

1. Manual Reactor Trip

push button

The Manual Reactor Trip ensures that the control room operator can initiate a reactor trip at any time by using either of two reactor trip switches in the control room. A Manual Reactor Trip accomplishes the same results as any one of the automatic trip Functions. It is used by the reactor operator to shut down the reactor whenever any parameter is rapidly trending toward its Trip Setpoint.

push button

The LCO requires two Manual Reactor Trip channels to be OPERABLE. Each channel is controlled by a manual reactor trip switch. Each channel activates the reactor trip breaker in both trains. Two independent channels are required to be OPERABLE so that no single random failure will disable the Manual Reactor Trip Function.

[illegible]

Rod Control

In MODE 1 or 2, manual initiation of a reactor trip must be OPERABLE. These are the MODES in which the shutdown rods and/or control rods are partially or fully withdrawn from the core. In MODE 3, 4, or 5, the manual initiation Function must also be OPERABLE if ~~the~~ shutdown rods or control rods are withdrawn or the ~~Control Rod Drive (CRD)~~ System is capable of withdrawing the shutdown rods or the control rods. In this condition, inadvertent control rod withdrawal is

R.1

T1

(continued)

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

1. Manual Reactor Trip (continued)

Rod Control

possible. In MODE 3, 4, or 5, manual initiation of a reactor trip does not have to be OPERABLE if the CRD System is not capable of withdrawing the shutdown rods or control rods. If the rods cannot be withdrawn from the core, there is no need to be able to trip the reactor ~~because~~ all of the rods are inserted. In MODE 6, neither the shutdown rods nor the control rods are permitted to be withdrawn and the CRDMs are disconnected from the control rods and shutdown rods. Therefore, the manual initiation Function is not required.

and if all rods are fully inserted

or

T.1

2. Power Range Neutron Flux

The NIS power range detectors are located external to the reactor vessel and measure neutrons leaking from the core. The NIS power range detectors provide input to the Rod Control System and ~~the Steam Generator (SG) Water Level~~ Control System. Therefore, the actuation logic must be able to withstand an input failure to the control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. Note that this Function also provides a signal to prevent automatic and manual rod withdrawal prior to initiating a reactor trip. Limiting further rod withdrawal may terminate the transient and eliminate the need to trip the reactor.

Turbine

Four channels of NIS are required because

three

R.1

a. Power Range Neutron Flux—High

The Power Range Neutron Flux—High trip Function ensures that protection is provided, from all power levels, against a positive reactivity excursion leading to DNB during power operations. These can be caused by rod withdrawal or reductions in RCS temperature.

The LCO requires all four of the Power Range Neutron Flux—High channels to be OPERABLE.

Insert: B3.3-9-01

R.1

In MODE 1 or 2, when a positive reactivity excursion could occur, the Power Range Neutron Flux—High trip must be OPERABLE. This Function

[illegible]

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-9-01:

These channels are considered OPERABLE during required Surveillance tests that require insertion of a test signal if the channel remains untripped and capable of tripping due to an increasing neutron flux signal.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

a. Power Range Neutron Flux—High (continued)

will terminate the reactivity excursion and shut down the reactor prior to reaching a power level that could damage the fuel. In MODE 3, 4, 5, or 6, the NIS power range detectors cannot detect neutron levels in this range. In these MODES, the Power Range Neutron Flux—High does not have to be OPERABLE because the reactor is shut down and reactivity excursions into the power range are extremely unlikely. Other RTS Functions and administrative controls provide protection against reactivity additions when in MODE 3, 4, 5, or 6.

Insert: B 3.3-10-01

b. Power Range Neutron Flux—Low

The LCO requirement for the Power Range Neutron Flux—Low trip Function ensures that protection is provided against a positive reactivity excursion from low power or subcritical conditions.

The LCO requires all four of the Power Range Neutron Flux—Low channels to be OPERABLE.

In MODE 1, below the Power Range Neutron Flux (P-10 setpoint), and in MODE 2, the Power Range Neutron Flux—Low trip must be OPERABLE. This Function may be manually blocked by the operator when two out of four power range channels are greater than approximately 10% RTP (P-10 setpoint). This Function is automatically unblocked when three out of four power range channels are below the P-10 setpoint. Above the P-10 setpoint, positive reactivity additions are mitigated by the Power Range Neutron Flux—High trip Function.

In MODE 3, 4, 5, or 6, the Power Range Neutron Flux—Low trip Function does not have to be OPERABLE because the reactor is shut down and the NIS power range detectors cannot detect neutron levels in this range. Other RTS trip Functions and administrative controls provide protection

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-10-01:

The Power Range Neutron Flux-High Allowable Value and Trip Setpoint are in accordance with Consolidated Edison Company of New York, Inc. Indian Point Nuclear Generating Station Unit No. 3 Plant Manual Volume VI: Precautions, Limitations, and Setpoints, March 1975 (Ref. 8).

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

b. Power Range Neutron Flux—Low (continued)

against positive reactivity additions or power excursions in MODE 3, 4, 5, or 6.

Insert
B 3.3-11-01

~~3. Power Range Neutron Flux Rate~~

~~The Power Range Neutron Flux Rate trips use the same channels as discussed for Function 2 above.~~

~~a. Power Range Neutron Flux—High Positive Rate~~

~~The Power Range Neutron Flux—High Positive Rate trip Function ensures that protection is provided against rapid increases in neutron flux that are characteristic of an RCCA drive rod housing rupture and the accompanying ejection of the RCCA. This Function compliments the Power Range Neutron Flux—High and Low Setpoint trip Functions to ensure that the criteria are met for a rod ejection from the power range.~~

~~The LCO requires all four of the Power Range Neutron Flux—High Positive Rate channels to be OPERABLE.~~

~~In MODE 1 or 2, when there is a potential to add a large amount of positive reactivity from a rod ejection accident (REA), the Power Range Neutron Flux—High Positive Rate trip must be OPERABLE. In MODE 3, 4, 5, or 6, the Power Range Neutron Flux—High Positive Rate trip Function does not have to be OPERABLE because other RTS trip Functions and administrative controls will provide protection against positive reactivity additions. Also, since only the shutdown banks may be withdrawn in MODE 3, 4, or 5, the remaining complement of control bank worth ensures a sufficient degree of SDM in the event of an REA. In MODE 6, no rods are withdrawn and the SDM is increased during refueling operations. The reactor vessel head is also removed or the closure bolts are detensioned preventing any pressure buildup. In addition, the NIS power range detectors cannot detect neutron levels present in this mode.~~

(continued)

INSERT B 3.3-11-01:

The Power Range Neutron Flux-Low Allowable Value and Trip Setpoint are in accordance with Consolidated Edison Company of New York, Inc. Indian Point Nuclear Generating Station Unit No. 3 Plant Manual Volume VI: Precautions, Limitations, and Setpoints, March 1975 (Ref. 8).

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

~~b. Power Range Neutron Flux—High Negative Rate~~

~~The Power Range Neutron Flux—High Negative Rate trip Function ensures that protection is provided for multiple rod drop accidents. At high power levels, a multiple rod drop accident could cause local flux peaking that would result in an unconservative local DNBR. DNBR is defined as the ratio of the heat flux required to cause a DNB at a particular location in the core to the local heat flux. The DNBR is indicative of the margin to DNB. No credit is taken for the operation of this Function for those rod drop accidents in which the local DNBRs will be greater than the limit.~~

~~The LCO requires all four Power Range Neutron Flux—High Negative Rate channels to be OPERABLE.~~

~~In MODE 1 or 2, when there is potential for a multiple rod drop accident to occur, the Power Range Neutron Flux—High Negative Rate trip must be OPERABLE. In MODE 3, 4, 5, or 6, the Power Range Neutron Flux—High Negative Rate trip Function does not have to be OPERABLE because the core is not critical and DNB is not a concern. Also, since only the shutdown banks may be withdrawn in MODE 3, 4, or 5, the remaining complement of control bank worth ensures a sufficient degree of SDM in the event of an REA. In MODE 6, no rods are withdrawn and the required SDM is increased during refueling operations. In addition, the NIS power range detectors cannot detect neutron levels present in this MODE.~~

③ ~~c~~. Intermediate Range Neutron Flux

The Intermediate Range Neutron Flux trip Function ensures that protection is provided against an uncontrolled RCCA bank rod withdrawal accident from a subcritical condition during startup. This trip Function provides redundant protection to the Power Range Neutron Flux—Low Setpoint trip Function. The NIS intermediate range detectors are located external to the reactor vessel and measure neutrons leaking from the core. The NIS intermediate range detectors

Insert: B 3.3-12-01

CLB.1

(continued)

INSERT B 3.3-12-01:

Therefore, only one of the two channels of Intermediate Range Neutron Flux is Required to be OPERABLE in the Applicable MODES. Either of the two channels can be used to satisfy this requirement.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

③ ~~4~~. Intermediate Range Neutron Flux (continued)

do not provide any input to control systems. Note that this Function also provides a signal to prevent automatic and manual rod withdrawal prior to initiating a reactor trip. Limiting further rod withdrawal may terminate the transient and eliminate the need to trip the reactor.

The LCO requires ~~two~~ One channel~~s~~ of Intermediate Range Neutron Flux to be OPERABLE. ~~Two~~ One OPERABLE channel~~s~~ ~~are~~ is sufficient ~~to ensure no single random failure will disable this trip Function~~.

Insert: B 3.3-13-01

Because this trip Function is important only during startup, there is generally no need to disable channels for testing while the Function is required to be OPERABLE. Therefore, a third channel is unnecessary.

In MODE 1 below the P-10 setpoint, and in MODE 2, above the P-6 setpoint when there is a potential for an uncontrolled RCCA bank rod withdrawal accident during reactor startup, the Intermediate Range Neutron Flux trip must be OPERABLE. Above the P-10 setpoint, the Power Range Neutron Flux—High Setpoint trip ~~and the Power Range Neutron Flux—High Positive Rate trip~~ provide core protection for a rod withdrawal accident. In MODE 3, 4, or 5, the Intermediate Range Neutron Flux trip does not have to be OPERABLE because the control rods must be fully inserted and only the shutdown rods may be withdrawn. The reactor cannot be started up in this condition. The core also has the required SDM to mitigate the consequences of a positive reactivity addition accident. In MODE 6, all rods are fully inserted and the core has a required increased SDM. Also, the NIS intermediate range detectors cannot detect neutron levels present in this MODE. (T.1)

(2)

Insert: B 3.3-13-02

(T.1)

④ ~~5~~. Source Range Neutron Flux

The LCO requirement for the Source Range Neutron Flux trip Function ensures that protection is provided against an uncontrolled RCCA bank rod withdrawal accident from a subcritical condition during startup. This trip Function provides redundant protection to

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-13-01:

to provide redundant protection to the Power Range Neutron Flux – Low Setpoint trip Function.

Table 3.3.1-1 identifies the Technical Specification Allowable Value for this trip function as not applicable (NA) because the LCO 3.3.1, Function 2.b, Power Range Neutron Flux-Low, is used to bound the analysis for an uncontrolled control rod assembly withdrawal from a subcritical condition. The surveillance acceptance criterion used for this function is 25% RTP. This value was established based on Indian Point Nuclear Generating Station Unit No. 3 Plant Manual Volume VI: Precautions, Limitations, and Setpoints, March 1975, (Ref. 8).

DB.1

INSERT B 3.3-13-02:

In MODE 2, below the P-6 setpoint, the source Range Neutron Flux Trip provides backup core protection for reactivity accidents.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

4 ~~3~~. Source Range Neutron Flux (continued)

Insert B 3.3-14-01

T.1

the Power Range Neutron Flux—Low ~~Setpoint and Intermediate Range Neutron Flux~~ trip Function~~s~~. In MODES 3, 4, and 5, administrative controls also prevent the uncontrolled withdrawal of rods. The NIS source range detectors are located external to the reactor vessel and measure neutrons leaking from the core. The NIS source range detectors do not provide any inputs to control systems. The source range trip is the only RTS automatic protection function required in MODES 3, 4, and 5. ~~Therefore, the functional capability at the specified Trip Setpoint is assumed to be available.~~

Insert B 3.3-14-02

R.1

One

One

is

The LCO requires two channel~~s~~ of Source Range Neutron Flux to be OPERABLE. Two OPERABLE channel~~s~~ ~~are~~ sufficient ~~to ensure no single random failure will disable this trip function. The LCO also requires one channel of the Source Range Neutron Flux to be OPERABLE in MODE 3, 4, or 5 with RTBs open. In this case, the source range Function is to provide control room indication and input to the Boron Dilution Protection System (BDPS). The outputs of the Function to RTS logic are not required OPERABLE when the RTBs are open.~~

Insert B 3.3-14-03

Insert B 3.3-14-06

The Source Range Neutron Flux Function provides protection for control rod withdrawal from subcritical~~, boron dilution and control rod ejection events~~. The Function also provides visual neutron flux indication in the control room.

T.1

Insert B 3.3-14-04

In MODE 2 when below the P-6 setpoint ~~during a reactor startup~~, the Source Range Neutron Flux trip must be OPERABLE. Above the P-6 setpoint, the Intermediate Range Neutron Flux trip and the Power Range Neutron Flux—Low ~~Setpoint~~ trip will provide core protection for reactivity accidents. Above the P-6 setpoint, the NIS source range detectors are de-energized ~~and inoperable~~.

T.1

Insert B 3.3-14-05

S and

In MODE 3, 4, ~~or~~ 5 with ~~the reactor shut down, the Source Range Neutron Flux trip Function must also be OPERABLE. If the CRD System is capable of rod withdrawal, the Source Range Neutron Flux trip must be~~

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-14-01:

Therefore, only one of the two channels of Source Range Neutron Flux is Required to be OPERABLE in the Applicable MODES. Either of the two channels can be used to satisfy this requirement.

INSERT B 3.3-14-02:

when rods are capable of withdrawal and one or more rods are not fully inserted.

INSERT B 3.3-14-03:

to provide redundant protection to the Power Range Neutron Flux – Low Setpoint trip Function.

INSERT B 3.3-14-04:

and in MODES 3, 4, and 5, when there is a potential for an uncontrolled RCCA bank withdrawal accident,

INSERT B 3.3-14-05:

all rods fully inserted and the Rod Control System not capable of rod withdrawal, and in MODE 6, the outputs of this function to the RPS logic are not required to be OPERABLE.

INSERT B 3.3-14-06:

Table 3.3.1-1 identifies the Technical Specification Allowable Value for this trip function as not applicable (NA) because the LCO 3.3.1, Function 2 b, Power Range Neutron Flux-Low, is used to bound the analysis for an uncontrolled control rod assembly withdrawal from a subcritical condition. The surveillance acceptance criterion used for this function is 5.0 E+5 counts per second. DB.1

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

(4) ~~5~~. Source Range Neutron Flux (continued)

~~OPERABLE to provide core protection against a rod withdrawal accident. If the CRD System is not capable of rod withdrawal, the source range detectors are not required to trip the reactor. However, their monitoring Function must be OPERABLE to monitor core neutron levels and provide indication of reactivity changes that may occur as a result of events like a boron dilution. These inputs are provided to the BDPS.~~ The requirements for the NIS source range detectors in MODE 6 are addressed in LCO 3.9.~~3~~ (2), "Nuclear Instrumentation."

~~6~~. Overtemperature ΔT

The Overtemperature ΔT trip Function is provided to ensure that the design limit DNBR is met. This trip Function also limits the range over which the Overpower ΔT trip Function must provide protection. The inputs to the Overtemperature ΔT trip include (a*1) pressure, coolant temperature, axial power distribution, and reactor power as indicated by loop ΔT assuming full reactor coolant flow. Protection from violating the DNBR limit is assured for those transients that are slow with respect to delays from the core to the measurement system. ~~The Function monitors both variation in power and flow since a decrease in flow has the same effect on ΔT as a power increase.~~ The Overtemperature ΔT trip Function uses each loop's ΔT as a measure of reactor power and is compared with a setpoint that is automatically varied with the following parameters:

- reactor coolant average temperature—the Trip Setpoint is varied to correct for changes in coolant density and specific heat capacity with changes in coolant temperature;
- pressurizer pressure—the Trip Setpoint is varied to correct for changes in system pressure; and
- axial power distribution—f(ΔI), the Trip Setpoint is varied to account for imbalances in the axial power distribution as detected by the

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

5 ~~6~~. Overtemperature ΔT (continued)

NIS upper and lower power range detectors. If axial peaks are greater than the ~~design~~ limit, as indicated by the difference between the upper and lower NIS power range detectors, the Trip Setpoint is reduced in accordance with Note 1 of Table 3.3.1-1.

Technical Specification

Dynamic compensation is included for system piping delays from the core to the temperature measurement system.

The Overtemperature ΔT trip Function is calculated for each loop as described in Note 1 of Table 3.3.1-1. Trip occurs if Overtemperature ΔT is indicated in two loops. ~~At some units,~~ ~~the~~ The pressure and temperature signals are used for other control functions. ~~For those units,~~ the actuation logic ~~must be able~~ to withstand an input failure to the control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. Note that this Function also provides a signal to generate a turbine runback prior to reaching the Trip Setpoint. A turbine runback will reduce turbine power and reactor power. A reduction in power will normally alleviate the Overtemperature ΔT condition and may prevent a reactor trip.

Therefore

is designed

The LCO requires all four channels of the Overtemperature ΔT trip Function to be OPERABLE ~~for two and four loop units (the LCO requires all three channels on the Overtemperature ΔT trip Function to be OPERABLE for three loop units)~~. Note that the Overtemperature ΔT Function receives input from channels shared with other RTS Functions. Failures that affect multiple Functions require entry into the Conditions applicable to all affected Functions.

In MODE 1 or 2, the Overtemperature ΔT trip must be OPERABLE to prevent DNB. In MODE 3, 4, 5, or 6, this trip Function does not have to be OPERABLE because the reactor is not operating and there is insufficient heat production to be concerned about DNB.

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

(6) ~~7.~~ Overpower ΔT

The Overpower ΔT trip Function ensures that protection is provided to ensure the integrity of the fuel (i.e., no fuel pellet melting and less than 1% cladding strain) under all possible overpower conditions. This trip Function also limits the required range of the Overtemperature ΔT trip Function and provides a backup to the Power Range Neutron Flux—High Setpoint trip. The Overpower ΔT trip Function ensures that the allowable heat generation rate (kW/ft) of the fuel is not exceeded. It uses the ΔT of each loop as a measure of reactor power with a setpoint that is automatically varied with the following parameters:

- reactor coolant average temperature—the Trip Setpoint is varied to correct for changes in coolant density and specific heat capacity with changes in coolant temperature; and
- rate of change of reactor coolant average temperature—including ~~dynamic~~ compensation for the delays between the core and the temperature measurement system.

a constant determined by dynamic considerations that provides

The Overpower ΔT trip Function is calculated for each loop as per Note 2 of Table 3.3.1-1. Trip occurs if Overpower ΔT is indicated in two loops. ~~At some units,~~ the temperature signals are used for other control functions. ~~At those units,~~ the actuation logic ~~must be able~~ to withstand an input failure to the control system, which may then require the protection function actuation and a single failure in the remaining channels providing the protection function actuation. Note that this Function also provides a signal to generate a turbine runback prior to reaching the Allowable Value. A turbine runback will reduce turbine power and reactor power. A reduction in power will normally alleviate the Overpower ΔT condition and may prevent a reactor trip.

Therefore,

is designed to

The LCO requires four channels ~~for two and four loop units (three channels for three loop units)~~ of the Overpower ΔT trip Function to be OPERABLE. Note that the Overpower ΔT trip Function receives input from

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

6 ~~7.~~ <u>Overpower ΔT</u> (continued)

channels shared with other RTS Functions. Failures that affect multiple Functions require entry into the Conditions applicable to all affected Functions.

In MODE 1 or 2, the Overpower ΔT trip Function must be OPERABLE. These are the only times that enough heat is generated in the fuel to be concerned about the heat generation rates and overheating of the fuel. In MODE 3, 4, 5, or 6, this trip Function does not have to be OPERABLE because the reactor is not operating and there is insufficient heat production to be concerned about fuel overheating and fuel damage.

7 ~~8.~~ <u>Pressurizer Pressure</u>

The same sensors provide input to the Pressurizer Pressure—High and —Low trips and the Overtemperature ΔT trip. ~~At some units,~~ The Pressurizer Pressure channels are also used to provide input to the Pressurizer Pressure Control System. ~~For those units~~ Therefore, the actuation logic ~~must be able~~ is designed to to withstand an input failure to the control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. Insert: B3.3-18-01

a. <u>Pressurizer Pressure—Low</u>

The Pressurizer Pressure—Low trip Function ensures that protection is provided against violating the DNBR limit due to low pressure.

The LCO requires four channels ~~for two and four loop units (three channels for three loop units)~~ of Pressurizer Pressure—Low to be OPERABLE.

In MODE 1, when DNB is a major concern, the Pressurizer Pressure—Low trip must be OPERABLE. This trip Function is automatically enabled on increasing power by the P-7 interlock (NIS power range P-10 or turbine ~~impulse~~ first stage pressure pressure greater than approximately 10% of full power equivalent

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-18-01:

Note that the plant design and this LCO require 4 channels for the Pressurizer Pressure-Low trips but requires only 3 channels of Pressurizer Pressure-High. This difference recognizes the role of pressurizer code safety valves in response to a high pressure condition.

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

a. Pressurizer Pressure—Low (continued)

(~~P-13~~). On decreasing power, this trip Function is automatically blocked below P-7. Below the P-7 setpoint, no conceivable power distributions can occur that would cause DNB concerns.

b. Pressurizer Pressure—High

The Pressurizer Pressure—High trip Function ensures that protection is provided against overpressurizing the RCS. This trip Function operates in conjunction with the pressurizer relief and safety valves to prevent RCS overpressure conditions.

three

The LCO requires ~~four~~ channels ~~for two and four loop units (three channels for three loop units)~~ of the Pressurizer Pressure—High to be OPERABLE.

Allowable Value

The Pressurizer Pressure—High ~~LSSS~~ is selected to be below the pressurizer safety valve actuation pressure and above the power operated relief valve (PORV) setting. This setting minimizes challenges to safety valves while avoiding unnecessary reactor trip for those pressure increases that can be controlled by the PORVs.

In MODE 1 or 2, the Pressurizer Pressure—High trip must be OPERABLE to help prevent RCS overpressurization and minimize challenges to the ~~relief and~~ safety valves. In MODE 3, 4, 5, or 6, the Pressurizer Pressure—High trip Function does not have to be OPERABLE because transients that could cause an overpressure condition will be slow to occur. Therefore, the operator will have sufficient time to evaluate unit conditions and take corrective actions. Additionally, low temperature overpressure protection systems provide overpressure protection when ~~below~~ MODE 4.

Insert:
B 3.3-19-01

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-19-01:

RCS temperature is less than the LTOP arming temperature specified in LCO 3.4.12, Low Temperature Overpressure Protection (LTOP).

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY
(continued)

⑧ ~~9~~. Pressurizer Water Level—High

The Pressurizer Water Level—High trip Function provides a backup signal for the Pressurizer Pressure—High trip and also provides protection against water relief through the pressurizer safety valves. These valves are designed to pass steam in order to achieve their design energy removal rate. A reactor trip is actuated prior to the pressurizer becoming water solid. The LCO requires three channels of Pressurizer Water Level—High to be OPERABLE. The pressurizer level channels are used as input to the Pressurizer Level Control System. A fourth channel is not required to address control/protection interaction concerns. The level channels do not actuate the safety valves, and the high pressure reactor trip is set below the safety valve setting. Therefore, with the slow rate of charging available, pressure overshoot due to level channel failure cannot cause the safety valve to lift before reactor high pressure trip.

because the

In MODE 1, when there is a potential for overfilling the pressurizer, the Pressurizer Water Level—High trip must be OPERABLE. This trip Function is automatically enabled on increasing power by the P-7 interlock. On decreasing power, this trip Function is automatically blocked below P-7. Below the P-7 setpoint, transients that could raise the pressurizer water level will be slow and the operator will have sufficient time to evaluate unit conditions and take corrective actions.

⑨ ~~10~~. Reactor Coolant Flow—Low

a. Reactor Coolant Flow—Low (Single Loop)

The Reactor Coolant Flow—Low (Single Loop) trip Function ensures that protection is provided against violating the DNBR limit due to low flow in one or more RCS loops, while avoiding reactor trips due to normal variations in loop flow. Above the P-8 setpoint, which is approximately 48% RTP, a loss of flow in any RCS loop will actuate a reactor trip. Each RCS loop has three flow detectors to monitor flow. The flow signals are not used for any control system input.

50%

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

a. Reactor Coolant Flow—Low (Single Loop) (continued)

The LCO requires three Reactor Coolant Flow—Low channels per RCS loop to be OPERABLE in MODE 1 above P-8.

Insert: B 3.3-21-01

In MODE 1 above the P-8 setpoint, a loss of flow in one RCS loop could result in DNB conditions in the core. In MODE 1 below the P-8 setpoint, a loss of flow in two or more loops is required to actuate a reactor trip (Function 10.b) because of the lower power level and the greater margin to the design limit DNBR.

9.b

T.2

b. Reactor Coolant Flow—Low (Two Loops)

The Reactor Coolant Flow—Low (Two Loops) trip Function ensures that protection is provided against violating the DNBR limit due to low flow in two or more RCS loops while avoiding reactor trips due to normal variations in loop flow.

Above the P-7 setpoint and below the P-8 setpoint, a loss of flow in two or more loops will initiate a reactor trip. Each loop has three flow detectors to monitor flow. The flow signals are not used for any control system input.

The LCO requires three Reactor Coolant Flow—Low channels per loop to be OPERABLE.

Insert: B 3.3-21-02

In MODE 1 above the P-7 setpoint and below the P-8 setpoint, the Reactor Coolant Flow—Low (Two Loops) trip must be OPERABLE. Below the P-7 setpoint, all reactor trips on low flow are automatically blocked since no conceivable power distributions could occur that would cause a DNB concern at this low power level. Above the P-7 setpoint, the reactor trip on low flow in two or more RCS loops is automatically enabled. Above the P-8 setpoint, a loss of flow in any one loop will actuate a reactor trip because of the higher power level and the reduced margin to the design limit DNBR.

Function 9.a

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-21-01:

Each reactor coolant loop is considered to be a separate function. Therefore, separate condition entry is allowed for each loop.

INSERT B 3.3-21-02:

Each reactor coolant loop is considered to be a separate function. Therefore, separate condition entry is allowed for each loop.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

10 ~~11~~. Reactor Coolant Pump (RCP) Breaker Position

Both RCP Breaker Position trip Function~~s~~ operate s ~~together on two sets of auxiliary contacts, with one set on each RCP breaker. These Functions~~ to anticipate the Reactor Coolant Flow—Low trips to avoid RCS heatup that would occur before the low flow trip actuates.

a. Reactor Coolant Pump Breaker Position (Single Loop)

The RCP Breaker Position (Single Loop) trip Function ensures that protection is provided against violating the DNBR limit due to a loss of flow in one RCS loop. The position of each RCP breaker is monitored. If one RCP breaker is open above the P-8 setpoint, a reactor trip is initiated. This trip Function will generate a reactor trip before the Reactor Coolant Flow—Low (Single Loop) Trip Setpoint is reached.

The LCO requires one RCP Breaker Position channel per RCP to be OPERABLE. One OPERABLE channel is sufficient for this trip Function because the RCS Flow—Low trip alone provides sufficient protection of unit SLs for loss of flow events. The RCP Breaker Position trip serves only to anticipate the low flow trip, minimizing the thermal transient associated with loss of a pump. Insert B33-22-01

This Function measures only the discrete position (open or closed) of the RCP breaker, using a position switch. Therefore, the Function has no adjustable trip setpoint with which to associate an LSSS.

In MODE 1 above the P-8 setpoint, when a loss of flow in any RCS loop could result in DNB conditions in the core, the RCP Breaker Position (Single Loop) trip must be OPERABLE. In MODE 1 below the P-8 setpoint, a loss of flow in two or more loops Function 10.b is required to actuate a reactor trip because of the lower power level and the greater margin to the design limit DNBR.

(continued)

INSERT B 3.3-22-01:

Each reactor coolant loop is considered to be a separate function. Therefore, separate condition entry is allowed for each loop.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

b. Reactor Coolant Pump Breaker Position (Two Loops)

The RCP Breaker Position (Two Loops) trip Function ensures that protection is provided against violating the DNBR limit due to a loss of flow in two or more RCS loops. The position of each RCP breaker is monitored. Above the P-7 setpoint ~~and below the P-8 setpoint~~, a loss of flow in two or more loops will initiate a reactor trip. This trip Function will generate a reactor trip before the Reactor Coolant Flow—Low (Two Loops) Trip Setpoint is reached.

The LCO requires one RCP Breaker Position channel per RCP to be OPERABLE. One OPERABLE channel is sufficient for this Function because the RCS Flow—Low trip alone provides sufficient protection of unit SLs for loss of flow events. The RCP Breaker Position trip serves only to anticipate the low flow trip, minimizing the thermal transient associated with loss of an RCP.

Insert B 3.3-23-01

This Function measures only the discrete position (open or closed) of the RCP breaker, using a position switch. Therefore, the Function has no adjustable trip setpoint with which to associate an LSSS.

In MODE 1 above the P-7 setpoint and below the P-8 setpoint, the RCP Breaker Position (Two Loops) trip must be OPERABLE. Below the P-7 setpoint, all reactor trips on loss of flow are automatically blocked since no conceivable power distributions could occur that would cause a DNB concern at this low power level. Above the P-7 setpoint, the reactor trip on loss of flow in two RCS loops is automatically enabled. Above the P-8 setpoint, a loss of flow in any one loop will actuate a reactor trip because of the higher power level and the reduced margin to the design limit DNBR.

Function 10.a

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-23-01:

Each reactor coolant loop is considered to be a separate function. Therefore, separate condition entry is allowed for each loop.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

(11) ~~12~~. Undervoltage Reactor Coolant Pumps (6.9 kV Bus)

The Undervoltage RCPs reactor trip Function ensures that protection is provided against violating the DNBR limit due to a loss of flow in two or more RCS loops. The voltage to each RCP is monitored. Above the P-7 setpoint, a loss of voltage detected on two or more RCP buses will initiate a reactor trip. This trip Function will generate a reactor trip before the Reactor Coolant Flow—Low (Two Loops) Trip Setpoint is reached. Time delays are incorporated into the Undervoltage RCPs channels to prevent reactor trips due to momentary electrical power transients.

direct

6.9 kV bus used to power an

direct

associated with the direct reactor trip are provided

The LCO requires ~~three~~ one Undervoltage RCPs channel~~s~~ ~~(one per phase)~~ per bus to be OPERABLE.

Insert: B3.3-24-01

R.1

In MODE 1 above the P-7 setpoint, the Undervoltage RCP trip must be OPERABLE. Below the P-7 setpoint, all reactor trips on loss of flow are automatically blocked since no conceivable power distributions could occur that would cause a DNB concern at this low power level. Above the P-7 setpoint, the reactor trip on loss of flow in two or more RCS loops is automatically enabled. ~~This Function uses the same relays as the ESFAS Function 6.f, "Undervoltage Reactor Coolant Pump (RCP)" start of the auxiliary feedwater (AFW) pumps.~~

(12) ~~13~~. Underfrequency Reactor Coolant Pumps

The Underfrequency RCPs reactor trip Function ensures that protection is provided against violating the DNBR limit due to a loss of flow in two or more RCS loops from a major network frequency disturbance. An underfrequency condition will slow down the pumps, thereby reducing their coastdown time following a pump trip. The proper coastdown time is required so that reactor heat can be removed immediately after reactor trip. The frequency of each RCP bus is monitored. ~~Above the P-7 setpoint~~ ~~A~~ loss of frequency detected on two or more RCP buses will initiate a reactor trip. This trip Function will generate a reactor trip before the Reactor Coolant Flow—Low (Two Loops) Trip Setpoint is reached. ~~Time delays are incorporated into the Underfrequency RCPs channels to prevent reactor trips due to momentary electrical power transients.~~

trips all four RCPs, a condition that

(continued)

INSERT: B3.3-24-01

The Allowable Value for this trip function is shown as NA because there is no analytical limit for RCP Undervoltage. The RCPs will continue to operate and deliver required RCS flow during an Undervoltage Condition. The reactor trip on RCP Undervoltage is a time-zero initiating event assumed in the safety analysis (Reference 3). The UV relay is adjusted for a nominal trip setpoint of 75% of the 6900 Vac bus voltage and the surveillance acceptance criterion used for this function is ≥70%.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

(12) ~~13~~. Underfrequency Reactor Coolant Pumps (continued)

one

The LCO requires three Underfrequency RCP~~s~~ channel~~s~~ per bus to be OPERABLE.

In MODE 1 above the P-7 setpoint, the Underfrequency RCPs trip must be OPERABLE. Below the P-7 setpoint, all reactor trips on loss of flow are automatically blocked since no conceivable power distributions could occur that would cause a DNB concern at this low power level. Above the P-7 setpoint, the reactor trip on loss of flow in two or more RCS loops is automatically enabled. R.1

(13) ~~14~~. Steam Generator Water Level—Low Low

The SG Water Level—Low Low trip Function ensures that protection is provided against a loss of heat sink and actuates the AFW System prior to uncovering the SG tubes. The SGs are the heat sink for the reactor. In order to act as a heat sink, the SGs must contain a minimum amount of water. A narrow range low low level in any SG is indicative of a loss of heat sink for the reactor. The "B" channel level transmitters provide input to the SG Level Control System. Therefore, the actuation logic must be able to withstand an input failure to the control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. This Function also performs the ESFAS function of starting the AFW pumps on low low SG level. R.1

three

The LCO requires four channels of SG Water Level—Low Low per SG to be OPERABLE ~~for four loop units in which these channels are shared between protection and control. In two, three, and four loop units where three SG Water Levels are dedicated to the RTS, only three channels per SG are required to be OPERABLE.~~

In MODE 1 or 2, when the reactor requires a heat sink, the SG Water Level—Low Low trip must be OPERABLE. The normal source of water for the SGs is the Main Feedwater (MFW) System (not safety related). The MFW System is only in operation in MODE 1 or 2. The AFW System is the safety related backup source of water to

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

(13) ~~14~~. Steam Generator Water Level—Low Low (continued)

ensure that the SGs remain the heat sink for the reactor. During normal startups and shutdowns, the AFW System provides feedwater to maintain SG level. In MODE 3, 4, 5, or 6, the SG Water Level—Low Low Function does not have to be OPERABLE because the MFW System is not in operation and the reactor is not ~~operating or even~~ critical. Decay heat removal is accomplished by the AFW System in MODE 3 and 4 ~~and by the~~ Residual Heat Removal (RHR) System in MODE 4, 5, or 6.

(14) ~~15~~. Steam Generator Water Level—Low, Coincident With Steam Flow/Feedwater Flow Mismatch

SG Water Level—Low, in conjunction with the Steam Flow/Feedwater Flow Mismatch, ensures that protection is provided against a loss of heat sink and actuates the AFW System ~~prior to uncovering the SG tubes~~. In addition to a decreasing water level in the SG, the difference between feedwater flow and steam flow is evaluated to determine if feedwater flow is significantly less than steam flow. With less feedwater flow than steam flow, SG level will decrease at a rate dependent upon the magnitude of the difference in flow rates. The required [illegible] is developed [illegible] ~~There are~~ two SG level channels and two Steam Flow/Feedwater Flow Mismatch channels per SG. One narrow range level channel ~~sensing a low level~~ coincident with the associated ~~one~~ Steam Flow/Feedwater Flow Mismatch channel for the same SG ~~sensing flow mismatch~~ (steam flow greater than feed flow) will actuate a reactor trip.

~~This function also initiates a turbine trip if reactor power is above the P-7 setpoint~~

The LCO requires two channels of SG Water Level—Low coincident with Steam Flow/Feedwater Flow Mismatch.

Insert B3.3-26-01

R.1

In MODE 1 or 2, when the reactor requires a heat sink, the SG Water Level—Low coincident with Steam Flow/Feedwater Flow Mismatch trip must be OPERABLE. The normal source of water for the SGs is the MFW System (not safety related). The MFW System is only in operation in MODE 1 or 2. The AFW System is the safety related backup source of water to ensure that the SGs remain the heat sink for the reactor. During normal startups and shutdowns, the AFW System provides feedwater to maintain SG level. In MODE 3, 4, 5,

(continued)

[illegible] condition [illegible]

INSERT B 3.3-26-01:

Table 3.3.1-1 identifies the Technical Specification Allowable Value for this trip function as not applicable (NA) because the LCO 3.3.1, Function 13, Steam Generator Water Level-Low Low, is used to bound the analysis for a loss of feedwater event. The allowable values required for OPERABILITY of Function 13 is ≥ 4.0%. The surveillance acceptance criteria used for Function 14 are ≥7.5% narrow range level and 3.3 E+5 pounds per hour steam flow/feedwater flow mismatch.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

14 ~~15~~. Steam Generator Water Level—Low, Coincident With Steam Flow/Feedwater Flow Mismatch (continued)

or 6, the SG Water Level—Low coincident with Steam Flow/Feedwater Flow Mismatch Function does not have to be OPERABLE because the MFW System is not in operation and the reactor is not ~~operating or even~~ critical. Decay heat removal is accomplished by the AFW System in MODE 3 and by the RHR System in MODE 4, 5, or 6. The MFW System is in operation only in MODE 1 or 2 and, therefore, this trip Function need only be OPERABLE in these MODES.

15 ~~16~~. ~~Turbine Trip~~

~~a.~~ Turbine Trip—Low ~~Fluid~~ Auto-Stop Oil Pressure

remove indent

The Turbine Trip—Low ~~Fluid~~ Oil Pressure trip Function anticipates the loss of heat removal capabilities of the secondary system following a turbine trip. This trip Function acts to minimize the pressure/temperature transient on the reactor. Any turbine trip from a power level below the ~~P-9~~ P-7 setpoint, approximately 50% 10% power, will not actuate a reactor trip. Three pressure switches monitor the control oil pressure in the Turbine ~~Electrohydraulic~~ Control System. A low pressure condition sensed by two-out-of-three pressure switches will actuate a reactor trip. These pressure switches do not provide any input to the control system. The unit is designed to withstand a complete loss of load and not sustain core damage or challenge the RCS pressure limitations. Core protection is provided by the Pressurizer Pressure—High trip Function and RCS integrity is ensured by the pressurizer safety valves.

The LCO requires three channels of Turbine Trip—Low Fluid Oil Pressure to be OPERABLE in MODE 1 above P-9 P-7.

Below the P-9 setpoint, a turbine trip does not actuate a reactor trip. In MODE 1 (below P-7 setpoint), 2, 3, 4, 5, or 6, there is no potential for a turbine trip, that would require a reactor trip

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

Auto-Stop

Turbine Trip—Low Fluid Oil Pressure (continued)

and the Turbine Trip—Low Fluid Oil Pressure trip Function does not need to be OPERABLE.

~~b. Turbine Trip—Turbine Stop Valve Closure~~

~~The Turbine Trip—Turbine Stop Valve Closure trip Function anticipates the loss of heat removal capabilities of the secondary system following a turbine trip from a power level below the P-9 setpoint, approximately 50% power. This action will not actuate a reactor trip. The trip Function anticipates the loss of secondary heat removal capability that occurs when the stop valves close. Tripping the reactor in anticipation of loss of secondary heat removal acts to minimize the pressure and temperature transient on the reactor. This trip Function will not and is not required to operate in the presence of a single channel failure. The unit is designed to withstand a complete loss of load and not sustain core damage or challenge the RCS pressure limitations. Core protection is provided by the Pressurizer Pressure—High trip Function, and RCS integrity is ensured by the pressurizer safety valves. This trip Function is diverse to the Turbine Trip—Low Fluid Oil Pressure trip Function. Each turbine stop valve is equipped with one limit switch that inputs to the RTS. If all four limit switches indicate that the stop valves are all closed, a reactor trip is initiated.~~

~~The LSSS for this Function is set to assure channel trip occurs when the associated stop valve is completely closed.~~

~~The LCO requires four Turbine Trip—Turbine Stop Valve Closure channels, one per valve, to be OPERABLE in MODE 1 above P-9. All four channels must trip to cause reactor trip.~~

~~Below the P-9 setpoint, a load rejection can be accommodated by the Steam Dump System. In MODE 2, 3, 4, 5, or 6, there is no potential for~~

(continued)

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

~~b. Turbine Trip—Turbine Stop Valve Closure (continued)~~

~~a load rejection, and the Turbine Trip—Stop Valve Closure trip Function does not need to be OPERABLE.~~

⑯ ~~17.~~ Safety Injection Input from Engineered Safety Feature Actuation System

The SI Input from ESFAS ensures that if a reactor trip has not already been generated by the RTS, the ESFAS automatic actuation logic will initiate a reactor trip signal upon any signal that initiates SI. This is a condition of acceptability for the LOCA. However, other transients and accidents take credit for varying levels of ESF performance and rely upon rod insertion, except for the most reactive rod that is assumed to be fully withdrawn, to ensure reactor shutdown. Therefore, a reactor trip is initiated every time an SI signal is present.

Trip Setpoint and Allowable Values are not applicable to this Function. The SI Input is provided by relay in the ESFAS. Therefore, there is no measurement signal with which to associate an LSSS.

The LCO requires two trains of SI Input from ESFAS to be OPERABLE in MODE 1 or 2.

A reactor trip is initiated every time an SI signal is present. Therefore, this trip Function must be OPERABLE in MODE 1 or 2, when the reactor is critical, and must be shut down in the event of an accident. In MODE 3, 4, 5, or 6, the reactor is not critical, and this trip Function does not need to be OPERABLE.

⑰ ~~18.~~ Reactor Trip System Interlocks

Reactor protection interlocks are provided to ensure reactor trips are in the correct configuration for the current unit status. They back up operator actions to ensure protection system Functions are not bypassed during unit conditions under which the safety analysis assumes the Functions are not bypassed. Therefore, the interlock Functions do not need to be OPERABLE

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

(17) ~~18~~. Reactor Trip System Interlocks (continued)

when the associated reactor trip functions are outside the applicable MODES. These are:

a. Intermediate Range Neutron Flux, P-6

The Intermediate Range Neutron Flux, P-6 interlock is actuated when any NIS intermediate range channel goes approximately one decade above the minimum channel reading. If both channels drop below the setpoint, the permissive will automatically be defeated. Insert: B3.3-30-01 The LCO requirement for the P-6 interlock ensures that the following Functions are performed:

- on increasing power, the P-6 interlock allows the manual block of the NIS Source Range, Neutron Flux reactor trip. This prevents a premature block of the source range trip and allows the operator to ensure that the intermediate range is OPERABLE prior to leaving the source range. ~~When~~ The source range trip is blocked ~~, the~~ by removing the high voltage to the detectors ~~is also removed~~.

- on decreasing power, the P-6 interlock automatically energizes the NIS source range detectors and enables the NIS Source Range Neutron Flux reactor trip; and

- ~~on increasing power, the P-6 interlock provides a backup block signal to the source range flux doubling circuit. Normally, this Function is manually blocked by the control room operator during the reactor startup.~~

The LCO requires two channels of Intermediate Range Neutron Flux, P-6 interlock to be OPERABLE in MODE 2 when below the P-6 interlock setpoint.

Above the P-6 interlock setpoint, the NIS Source Range Neutron Flux reactor trip will be blocked, and this Function will no longer be necessary.

(continued)

INSERT B 3.3-30-01:

Manual defeat of the P-6 interlock can be accomplished at any time by simultaneous actuation of both Reset pushbuttons.

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

a. Intermediate Range Neutron Flux, P-6 (continued)

In MODE 3, 4, 5, or 6, the P-6 interlock does not have to be OPERABLE because the NIS Source Range is providing core protection.

if required

b. Low Power Reactor Trips Block, P-7

R.1 insert B3.3-31-03

First Stage

The Low Power Reactor Trips Block, P-7 interlocks is actuated by input from either the Power Range Neutron Flux, P-10, or the Turbine Impulse Pressure ~~P-13 interlock~~. The LCO requirement for the P-7 interlock ensures that the following Functions are performed:

Insert B 3.3-31-01

(1) on increasing power, the P-7 interlock automatically enables reactor trips on the following Functions:

- Pressurizer Pressure—Low;
- Pressurizer Water Level—High;
- Reactor Coolant Flow—Low (Two Loops);
- RCPs Breaker Open (Two Loops);
- Undervoltage RCPs; and
- Underfrequency RCPs.

R.1

These reactor trips are only required when operating above the P-7 setpoint (approximately 10% power). The reactor trips provide protection against violating the DNBR limit. Below the P-7 setpoint, the RCS is capable of providing sufficient natural circulation without any RCP running.

Insert B 3.3-31-02

(2) on decreasing power, the P-7 interlock automatically blocks reactor trips on the following Functions:

- Pressurizer Pressure—Low;

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-31-01:

(i.e., 2 of 4 Power Range channels increasing above the P-10 (Function 17.d) setpoint or 1 of 2 Turbine First Stage Pressure (Function 17.e) setpoint)

INSERT B 3.3-31-02:

(i.e., 3 of 4 Power Range channels decreasing below the P-10 (Function 17.d) setpoint and 2 of 2 Turbine First Stage Pressure channels decreasing below the Turbine First Stage Pressure (Function 17.e) setpoint)

INSERT B 3.3-31-03:

The Allowable Value is NA for this Function because there is no corresponding analytical limit modeled in the accident analysis. The surveillance acceptance criterion used for this function is ≥3.1 E-11 Amps.

NPA

APPLICABLE SAFETY, ANALYSES, LCO, and APPLICABILITY

b. Low Power Reactor Trips Block, P-7 (continued)

- Pressurizer Water Level—High;
- Reactor Coolant Flow—Low (Two Loops);
- RCP Breaker Position (Two Loops);
- Undervoltage RCPs; and
- Underfrequency RCPs.

| R.1

An ~~Trip Setpoint and~~ Allowable Value are not applicable to the P-7 interlock because it is a logic Function. ~~and thus has no parameter with which to associate an LSSS.~~

Insert: B3.3-32-01

The P-7 interlock is a logic Function with train and not channel identity. Therefore, the LCO requires one channel per train of Low Power Reactor Trips Block, P-7 interlock to be OPERABLE in MODE 1.

i.e. two trains

The low power trips are blocked below the P-7 setpoint and unblocked above the P-7 setpoint. In MODE 2, 3, 4, 5, or 6, this Function does not have to be OPERABLE because the interlock performs its Function when power level drops below 10% power, which is in MODE 1.

c. Power Range Neutron Flux, P-8

50%

The Power Range Neutron Flux, P-8 interlock is actuated at approximately 48% power as determined by ~~two-out-of-four~~ NIS power range detectors. The P-8 interlock automatically enables the Reactor Coolant Flow—Low (Single Loop) and RCP Breaker Position (Single Loop) reactor trips on low flow in one or more RCS loops ~~on increasing power~~. The LCO requirement for this trip Function ensures that protection is provided against a loss of flow in any RCS loop that could result in DNB conditions in the core when greater than approximately 48% power. On decreasing

Insert: B3.3-32-02

50%

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT E 3.3-32-01:

The Allowable Value for the P-10 interlock (Function 17.d) governs input from the Power Range instruments and the Allowable Value for the Turbine First Stage Pressure interlock (Function 17.e) governs input for turbine power.

INSERT B 3.3-32-02:

whenever at least 2 of 4 of the Power Range instruments increase to above the P-8 setpoint.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

c. Power Range Neutron Flux, P-8 (continued)

power, the reactor trip on low flow in any loop is automatically blocked.

Insert B33-33-01

The LCO requires four channels of Power Range Neutron Flux, P-8 interlock to be OPERABLE in MODE 1.

In MODE 1, a loss of flow in one RCS loop could result in DNB conditions, so the Power Range Neutron Flux, P-8 interlock must be OPERABLE. In MODE 2, 3, 4, 5, or 6, this Function does not have to be OPERABLE because the core is not producing sufficient power to be concerned about DNB conditions.

DB.1

Insert B 3.3-33-02

R.1

~~d. Power Range Neutron Flux, P-9~~

~~The Power Range Neutron Flux, P-9 interlock is actuated at approximately 50% power as determined by two-out-of-four NIS power range detectors. The LCO requirement for this Function ensures that the Turbine Trip—Low Fluid Oil Pressure and Turbine Trip—Turbine Stop Valve Closure reactor trips are enabled above the P-9 setpoint. Above the P-9 setpoint, a turbine trip will cause a load rejection beyond the capacity of the Steam Dump System. A reactor trip is automatically initiated on a turbine trip when it is above the P-9 setpoint, to minimize the transient on the reactor.~~

~~The LCO requires four channels of Power Range Neutron Flux, P-9 interlock to be OPERABLE in MODE 1.~~

~~In MODE 1, a turbine trip could cause a load rejection beyond the capacity of the Steam Dump System, so the Power Range Neutron Flux interlock must be OPERABLE. In MODE 2, 3, 4, 5, or 6, this Function does not have to be OPERABLE because the reactor is not at a power level sufficient to have a load rejection beyond the capacity of the Steam Dump System.~~

(continued)

INSERT: B 3.3-33-01:

whenever at least 3 of 4 of the Power Range instruments decrease to below the P-8 setpoint.

INSERT: B 3.3-33-02

The allowable value is NA for this Function because there is no corresponding analytical limit modeled in the accident analysis. The surveillance acceptance criterion used for this Function is ≤50% RTP.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

d ~~e.~~ Power Range Neutron Flux, P-10

The Power Range Neutron Flux, P-10 interlock is actuated at approximately 10% power, as determined by two-out-of-four NIS power range detectors. If power level falls below 10% RTP on 3 of 4 channels, the nuclear instrument trips will be automatically unblocked. The LCO requirement for the P-10 interlock ensures that the following Functions are performed:

- on increasing power, the P-10 interlock allows the operator to manually block the Intermediate Range Neutron Flux reactor trip. ~~Note that blocking the reactor trip also blocks the signal to prevent automatic and manual rod withdrawal~~;
- on increasing power, the P-10 interlock allows the operator to manually block the Power Range Neutron Flux—Low reactor trip;
- on increasing power, the P-10 interlock automatically provides a backup signal to block the Source Range Neutron Flux reactor trip~~, and also to de-energize~~ for de-energizing the NIS source range detectors;
- the P-10 interlock provides one of the two inputs to the P-7 interlock; and
- on decreasing power, the P-10 interlock automatically enables the Power Range Neutron Flux—Low reactor trip and the Intermediate Range Neutron Flux reactor trip (and rod stop).

The LCO requires four channels of Power Range Neutron Flux, P-10 interlock to be OPERABLE in MODE 1 or 2.

OPERABILITY in MODE 1 ensures the Function is available to perform its decreasing power Functions in the event of a reactor shutdown. This Function must be OPERABLE in MODE 2 to ensure that core protection is provided during a

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

d ~~e.~~ Power Range Neutron Flux, P-10 (continued)

startup or shutdown by the Power Range Neutron Flux—Low and Intermediate Range Neutron Flux reactor trips. In MODE 3, 4, 5, or 6, this Function does not have to be OPERABLE because the reactor is not at power and the Source Range Neutron Flux reactor trip provides core protection.

Insert: B3.3-35-02

DB.1

R.1

e ~~f.~~ Turbine Impulse Pressure, ~~P-13~~

First Stage

The Turbine Impulse Pressure, ~~P-13~~ interlock is actuated when the pressure in the first stage of the high pressure turbine is greater than approximately 10% of the rated full power pressure. This is determined by one-out-of-two pressure detectors. The LCO requirement for this Function ensures that one of the inputs to the P-7 interlock is available.

The LCO requires two channels of Turbine Impulse Pressure, ~~P-13~~ interlock, to be OPERABLE in MODE 1.

P-7

The Turbine Impulse Chamber Pressure, P-13 interlock must be OPERABLE when the turbine generator is operating. The interlock Function is not required OPERABLE in MODE 2, 3, 4, 5, or 6 because the turbine generator is not operating.

Insert: B3.3-35-03

DB.1

R.1

18 ~~19.~~ Reactor Trip Breakers

This trip Function applies to the RTBs exclusive of individual trip mechanisms. The LCO requires two OPERABLE trains of trip breakers. A trip breaker train consists of all trip breakers associated with a single RTS logic train that are racked in, closed, and capable of supplying power to the CRD System. Thus, the train may consist of the main breaker, bypass breaker, or main breaker and bypass breaker, depending upon the system configuration. Two OPERABLE trains ensure no single random failure can disable the RTS trip capability.

Rod Control

T.1

Insert: B 3.3-35-01

(continued)

INSERT B 3.3-35-01:

The LCO requires two OPERABLE trains of trip breakers. Two OPERABLE trains ensure no single random failure can disable the RPS trip capability. When a reactor trip breaker is being tested, both reactor trip breaker and the reactor trip bypass breaker associated with RPS logic train not in test are closed. In this configuration, a single failure in the RPS logic train not in test could disable RPS trip capability; therefore, limits on the duration of testing are established.

INSERT: B 3.3-35-02

The allowable value is NA for this Function because there is no corresponding analytical limit modeled in the accident analysis. The surveillance acceptance criterion used for this Function is <10% RTP.

INSERT: B 3.3-35-03

The allowable value is NA for this Function because there is no corresponding analytical limit modeled in the accident analysis. The surveillance acceptance criterion used for this Function is <10% RTP.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

(18) ~~19~~. Reactor Trip Breakers (continued)

These trip Functions must be OPERABLE in MODE 1 or 2 when the reactor is critical. In MODE 3, 4, or 5, these RTS trip Functions must be OPERABLE when the ~~RTBs or associated bypass breakers are closed, and the CRD System is capable of rod withdrawal.~~

Insert: B 3.3-36-01

(T.1)

(19) ~~20~~. Reactor Trip Breaker Undervoltage and Shunt Trip Mechanisms

The LCO requires both the Undervoltage and Shunt Trip Mechanisms to be OPERABLE for each RTB that is in service. The trip mechanisms are not required to be OPERABLE for trip breakers that are open, racked out, incapable of supplying power to the ~~CRD~~ Rod Control System, or declared inoperable under Function ~~19~~ (18) above. OPERABILITY of both trip mechanisms on each breaker ensures that no single trip mechanism failure will prevent opening any breaker on a valid signal.

These trip Functions must be OPERABLE in MODE 1 or 2 when the reactor is critical. In MODE 3, 4, or 5, these RTS trip Functions must be OPERABLE when the ~~RTBs and associated bypass breakers are closed, and the CRD System is capable of rod withdrawal.~~

Insert B 3.3-36-02

(T.1)

(20) ~~21~~. Automatic Trip Logic

The LCO requirement for the RTBs (Functions ~~19~~ (18) and ~~20~~ (19)) (20) and Automatic Trip Logic (Function ~~21~~) ensures that means are provided to interrupt the power to allow the rods to fall into the reactor core. Each RTB and RTBB is equipped with an undervoltage coil and a shunt trip coil to trip the breaker open when needed. Each RTB is equipped with a bypass breaker to allow testing of the trip breaker while the unit is at power. The reactor trip signals generated by the RTS Automatic Trip Logic cause the RTBs and associated bypass breakers to open and shut down the reactor.

The LCO requires two trains of RTS Automatic Trip Logic to be OPERABLE. Having two OPERABLE channels ensures that random failure of a single logic channel will not prevent reactor trip.

(continued)

INSERT B 3.3-36-01:

Rod Control System is capable of rod withdrawal or one or more rods are not fully inserted.

INSERT B 3.3-36-02:

Rod Control System is capable of rod withdrawal or one or more rods are not fully inserted.

BASES

APPLICABLE SAFETY ANALYSES LCO, and APPLICABILITY

21. Automatic Trip Logic (continued)

These trip Functions must be OPERABLE in MODE 1 or 2 when the reactor is critical. In MODE 3, 4, or 5, these RTS trip Functions must be OPERABLE when the ~~RTBs and associated bypass breakers are closed, and the CRD System is capable of rod withdrawal~~.

Insert B33-37-01

The RTS instrumentation satisfies Criterion 3 of ~~the NRC Policy Statement~~ 10 CFR 50.36.

ACTIONS

A Note has been added to the ACTIONS to clarify the application of Completion Time rules. The Conditions of this Specification may be entered independently for each Function listed in Table 3.3.1-1.

Insert B3.3-37-02

R.1

In the event a channel's Trip Setpoint is found nonconservative with respect to the Allowable Value, or the transmitter, instrument loop, signal processing electronics, or bistable is found inoperable, then all affected Functions provided by that channel must be declared inoperable and the LCO Condition(s) entered for the protection Function(s) affected.

When the number of inoperable channels in a trip Function exceed those specified in one or other related Conditions associated with a trip Function, then the unit is outside the safety analysis. Therefore, LCO 3.0.3 must be immediately entered if applicable in the current MODE of operation.

~~Reviewer's Note: Certain LCO Completion Times are based on approved topical reports. In order for a licensee to use these times, the licensee must justify the Completion Times as required by the staff Safety Evaluation Report (SER) for the topical report.~~

A.1

Condition A applies to all RTS protection Functions. Condition A addresses the situation where one or more required channels or trains for one or more Functions are inoperable

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-37-01:

Rod Control System is capable of rod withdrawal or one or more rods are not fully inserted.

INSERT: B 3.3-37-02

Note 2 specifies that when a channel or train is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 8 hours, provided the associated Function(s) maintains RPS trip capability. Upon completion of the Surveillance, or expiration of the 8 hour allowance, the channel must be returned to OPERABLE status or the applicable Condition entered and Required Actions taken. This Note is consistent with the assumptions of the instrumentation system reliability analysis (Ref. 7). That analysis demonstrated that the 8 hour testing allowance does not significantly reduce the probability that the RPS will trip when necessary.

R-1

As noted in Reference 9, the allowance of 2 hours for test and maintenance of reactor trip breakers provided in Condition L, Note 1, is less than the 6 hour allowable out of service time and the 8 hour allowance for testing of RPS train A and train B. In practice, if the reactor trip breaker is being tested at the same time as the associated logic train, the 8 hour allowance for testing of RPS train A and train B applies to both the logic train and the reactor trip breaker. This is acceptable based on the Safety Evaluation Report for Reference 7.

BASES

ACTIONS

A.1 (continued)

at the same time. The Required Action is to refer to Table 3.3.1-1 and to take the Required Actions for the protection functions affected. The Completion Times are those from the referenced Conditions and Required Actions.

B.1~~, B.2.1,~~ and B.2~~.2~~

relay logic

Condition B applies to the Manual Reactor Trip in MODE 1 or 2. This action addresses the train orientation of the ~~SSPS~~ for this Function. With one channel inoperable, the inoperable channel must be restored to OPERABLE status within 48 hours. In this Condition, the remaining OPERABLE channel is adequate to perform the safety function.

The Completion Time of 48 hours is reasonable considering that there are two automatic actuation trains and another manual initiation channel OPERABLE, and the low probability of an event occurring during this interval.

If the Manual Reactor Trip Function cannot be restored to OPERABLE status within the allowed 48 hour Completion Time, the unit must be brought to a MODE in which the requirement does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 additional hours (54 hours total time) ~~followed by opening the RTBs within 1 additional hour (55 hours total time)~~. The 6 additional hours to reach MODE 3 ~~and the 1 hour to open the RTBs are~~ is reasonable, based on operating experience, to reach MODE 3 ~~and open the RTBs~~ from full power operation in an orderly manner and without challenging unit systems. With the ~~RTBs open and the~~ unit in MODE 3, ~~this trip Function is no longer required to be OPERABLE~~.

T.1

Insert B 3.3-38-01

C.1 and C.2

Condition C applies to when the following reactor trip Functions in MODE 3, 4, or 5 ~~with~~ the ~~RTBs closed and the CRD System capable of rod withdrawal~~.

T.1

Insert: B 3.3-38-02

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-38-01: Ⓣ.1

ACTION C applies to any inoperable Manual Reactor Trip Function if the Rod Control System is capable of rod withdrawal or one or more rods are not fully inserted.

INSERT B 3.3-38-02: Ⓣ.1

Rod Control System capable of rod withdrawal or one or more rods are not fully inserted.

BASES

ACTIONS

C.1 and C.2 (continued)

- Manual Reactor Trip;
- RTBs;
- RTB Undervoltage and Shunt Trip Mechanisms; and
- Automatic Trip Logic.

relay logic

This action addresses the train orientation of the SSPS for these Functions. With one channel or train inoperable, the inoperable channel or train must be restored to OPERABLE status within 48 hours. If the affected Function(s) cannot be restored to OPERABLE status within the allowed 48 hour Completion Time, the unit must be placed in a MODE in which the requirement does not apply. To achieve this status, ~~the RTBs must be opened within the next hour.~~ The additional hour provides sufficient time to accomplish the action in an orderly manner. With ~~the RTBs open~~, these Functions are no longer required.

Insert: B 3.3-39-01

Insert B 3.3-39-02

T.1

The Completion Time is reasonable considering that in this Condition, the remaining OPERABLE train is adequate to perform the safety function, and given the low probability of an event occurring during this interval.

D.1~~.1~~, ~~D.1.2~~, ~~D.2.1~~, D.2~~.2~~, ~~and D.3~~

R.1

Condition D applies to the Power Range Neutron Flux—High Function.

Rod Control

T.1

The NIS power range detectors provide input to the ~~CRD~~ System ~~and the SG Water Level Control System~~ and, therefore, have a two-out-of-four trip logic. A known inoperable channel must be placed in the tripped condition. This results in a partial trip condition requiring only one-out-of-three logic for actuation. The 6 hours allowed to place the inoperable channel in the tripped condition is justified in WCAP-10271-P-A (Ref. 7).

In addition to placing the inoperable channel in the tripped condition, THERMAL POWER must be reduced to ≤ 75% RTP within ~~12~~ 24 hours. Reducing the power level prevents operation of the core with radial power distributions beyond the design

R.1

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-39-01:

action must be initiated within the same 48 hours to ensure that all rods are fully inserted, and the Rod Control System must be placed in a condition incapable of rod withdrawal within the next hour.

INSERT B 3.3-39-02:

rods fully inserted and the Rod Control System incapable of rod withdrawal.

BASES

ACTIONS

D.1.~~1~~, ~~D.1.2, D.2.1,~~ D.2.~~2~~, ~~and D.3~~ (continued)

limits. With one of the NIS power range detectors inoperable, 1/4 of the radial power distribution monitoring capability is lost.

R.1

As an alternative to the above actions, the inoperable channel can be placed in the tripped condition within 6 hours and the QPTR monitored once every ⑫ hours as per SR 3.2.4.2, QPTR verification. Calculating QPTR every ⑫ hours compensates for the lost monitoring capability due to the inoperable NIS power range channel and allows continued unit operation at power levels ≥ 75% RTP. The 6 hour Completion Time ~~and the ⑫ hour Frequency are~~ is consistent with LCO 3.2.4, "QUADRANT POWER TILT RATIO (QPTR)."

24

24

24

As an alternative to the above Actions, the plant must be placed in a MODE where this Function is no longer required OPERABLE. Twelve hours are allowed to place the plant in MODE 3. This is a reasonable time, based on operating experience, to reach MODE 3 from full power in an orderly manner and without challenging plant systems. If Required Actions cannot be completed within their allowed Completion Times, LCO 3.0.3 must be entered.

The Required Actions have been modified by a Note that allows placing the inoperable channel in the bypass condition for up to ④ hours while performing routine surveillance testing of other channels. The Note also allows placing the inoperable channel in the bypass condition to allow setpoint adjustments of other channels when required to reduce the setpoint in accordance with other Technical Specifications. The ④ hour time limit is justified in Reference 7.

8

3

Required Action D.2.2 has been modified by a Note which only requires SR 3.2.4.2 to be performed if the Power Range Neutron Flux input to QPTR becomes inoperable. Failure of a component in the Power Range Neutron Flux Channel which renders the High Flux Trip Function inoperable may not affect the capability to monitor QPTR. As such, determining QPTR using this movable incore detectors once per ⑫ hours may not be necessary.

24

R.1

(continued)

BASES

ACTIONS
(continued)

E.1 and E.2

Condition E applies to the following reactor trip Functions:

- Power Range Neutron Flux—Low;
- Overtemperature ΔT;
- Overpower ΔT;
- ~~Power Range Neutron Flux—High Positive Rate;~~
- ~~Power Range Neutron Flux—High Negative Rate;~~
- Pressurizer Pressure—High;
- SG Water Level—Low Low; and
- SG Water Level—Low coincident with Steam Flow/ Feedwater Flow Mismatch.

A known inoperable channel must be placed in the tripped condition within 6 hours. Placing the channel in the tripped condition results in a partial trip condition requiring only one-out-of-two logic for actuation of the two-out-of-three trips and one-out-of-three logic for actuation of the two-out-of-four trips. The 6 hours allowed to place the inoperable channel in the tripped condition is justified in Reference 7.

If the operable channel cannot be placed in the trip condition within the specified Completion Time, the unit must be placed in a MODE where these Functions are not required OPERABLE. An additional 6 hours is allowed to place the unit in MODE 3. Six hours is a reasonable time, based on operating experience, to place the unit in MODE 3 from full power in an orderly manner and without challenging unit systems.

⑧ The Required Actions have been modified by a Note that allows placing the inoperable channel in the bypassed condition for up to ④ hours while performing routine surveillance testing of the other channels. The ④ hour time limit is justified in Reference 7.

⑧

(continued)

BASES

ACTIONS (continued)

~~F.1 and F.2~~

~~Condition F applies to the Intermediate Range Neutron Flux trip when THERMAL POWER is above the P-6 setpoint and below the P-10 setpoint and one channel is inoperable. Above the P-6 setpoint and below the P-10 setpoint, the NIS intermediate range detector performs the monitoring Functions. If THERMAL POWER is greater than the P-6 setpoint but less than the P-10 setpoint, 2 hours is allowed to reduce THERMAL POWER below the P-6 setpoint or increase to THERMAL POWER above the P-10 setpoint. The NIS Intermediate Range Neutron Flux channels must be OPERABLE when the power level is above the capability of the source range, P-6, and below the capability of the power range, P-10. If THERMAL POWER is greater than the P-10 setpoint, the NIS power range detectors perform the monitoring and protection functions and the intermediate range is not required. The Completion Times allow for a slow and controlled power adjustment above P-10 or below P-6 and take into account the redundant capability afforded by the redundant OPERABLE channel, and the low probability of its failure during this period. This action does not require the inoperable channel to be tripped because the Function uses one-out-of-two logic. Tripping one channel would trip the reactor. Thus, the Required Actions specified in this Condition are only applicable when channel failure does not result in reactor trip.~~

CLB.1

F F
~~G~~.1 and ~~G~~.2

CLB.1

Condition ~~G~~ F applies ~~to two inoperable~~ when there are no Intermediate Range Neutron Flux trip channels OPERABLE, in MODE 2 when THERMAL POWER is above the P-6 setpoint and below the P-10 setpoint. Required Actions specified in this Condition are only applicable when channel failures do not result in reactor trip. Above the P-6 setpoint and below the P-10 setpoint, the NIS intermediate range detector performs the monitoring Functions. With no intermediate range channels OPERABLE, the Required Actions are to suspend operations involving positive reactivity additions immediately. This will preclude any power level increase since there are no OPERABLE Intermediate Range Neutron Flux channels. The operator must also reduce THERMAL POWER below the P-6 setpoint within two hours. Below P-6, the one or both Source Range Neutron Flux channels will be able to monitor the core power

(continued)

BASES

ACTIONS

~~G~~F.1 and ~~G~~F.2 (continued)

level. The Completion Time of 2 hours will allow a slow and controlled power reduction to less than the P-6 setpoint and takes into account the low probability of occurrence of an event during this period that may require the protection afforded by the NIS Intermediate Range Neutron Flux trip.

~~H.1~~

~~Condition H applies to the Intermediate Range Neutron Flux trip when THERMAL POWER is below the P-6 setpoint and one or two channels are inoperable. Below the P-6 setpoint, the NIS source range performs the monitoring and protection functions. The inoperable NIS intermediate range channel(s) must be returned to OPERABLE status prior to increasing power above the P-6 setpoint. The NIS intermediate range channels must be OPERABLE when the power level is above the capability of the source range, P-6, and below the capability of the power range, P-10.~~

T.1

~~I.1~~

~~Condition I applies to one inoperable Source Range Neutron Flux trip channel when in MODE 2, below the P-6 setpoint, and performing a reactor startup. With the unit in this Condition, below P-6, the NIS source range performs the monitoring and protection functions. With one of the two channels inoperable, operations involving positive reactivity additions shall be suspended immediately.~~

~~This will preclude any power escalation. With only one source range channel OPERABLE, core protection is severely reduced and any actions that add positive reactivity to the core must be suspended immediately.~~

CLB.1

G ~~J~~.1

Condition ~~J~~ G applies ~~to two inoperable~~ when there are no Source Range Neutron Flux trip channels OPERABLE when in MODE 2, below the P-6 setpoint, and ~~performing a reactor startup, or~~ in MODE 3, 4, or 5 with the ~~RTBs closed and the CRD System~~ Rod Control capable of rod withdrawal. Insert: B 3.3-43-01 With the unit in this Condition, below P-6, the

T.1

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-43-01:

or one or more rods not rods fully inserted

BASES

ACTIONS

G

~~J~~.1 (continued)

NIS source range performs the monitoring and protection functions. With both source range channels inoperable, the RTBs must be opened immediately. With the RTBs open, the core is in a more stable condition~~, and the unit enters Condition L.~~

R.1
RAI 3.3.1-15
(G1)

K.1 and K.2

T.1

Condition ~~K~~ applies to one inoperable source range channel in MODE 3, 4, or 5 with the ~~RTBs closed and the CRD~~ Rod Control System capable of rod withdrawal. With the unit in this Condition, below P-6, the NIS source range performs the monitoring and protection functions. With one of the source range channels inoperable, 48 hours is allowed to restore it to an OPERABLE status. If the channel cannot be returned to an OPERABLE status, ~~1 additional hour is allowed to open the RTBs.~~ Once the RTBs are open, the core is in a more stable condition and the unit enters Condition L. The allowance of 48 hours to restore the channel to OPERABLE status, and the additional hour to open the RTBs are justified in Reference 7.

Insert B 3.3-44-01

Insert B 3.3-44-02

CLB.1

T.1

L.1, L.2, and L.3

Condition L applies when the required number of OPERABLE Source Range Neutron Flux channels is not met in MODE 3, 4, or 5 with the RTBs open. With the unit in this Condition, the NIS source range performs the monitoring and protection functions. With less than the required number of source range channels OPERABLE, operations involving positive reactivity additions shall be suspended immediately. This will preclude any power escalation. In addition to suspension of positive reactivity additions, all valves that could add unborated water to the RCS must be closed within 1 hour as specified in LCO 3.9.2. The isolation of unborated water sources will preclude a boron dilution accident.

T.1

Also, the SDM must be verified within 1 hour and once every 12 hours thereafter as per SR 3.1.1.1, SDM verification. With no source range channels OPERABLE, core protection is severely reduced. Verifying the SDM within 1 hour allows

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-44-01: Deleted.

INSERT B 3.3-44-02: Deleted.

BASES

ACTIONS

~~L.1, L.2, and L.3 (continued)~~

~~sufficient time to perform the calculations and determine that the SDM requirements are met. The SDM must also be verified once per 12 hours thereafter to ensure that the core reactivity has not changed. Required Action L.1 precludes any positive reactivity additions; therefore, core reactivity should not be increasing, and a 12 hour Frequency is adequate. The Completion Times of within 1 hour and once per 12 hours are based on operating experience in performing the Required Actions and the knowledge that unit conditions will change slowly.~~

T.1

~~M~~H.1 and ~~M~~H.2

Condition ~~M~~ H applies to the following reactor trip Functions:

- Pressurizer Pressure—Low;
- Pressurizer Water Level—High;
- Reactor Coolant Flow—Low ~~(Two Loops)~~;
- RCP Breaker Position (Two Loops);
- Undervoltage RCPs; and
- Underfrequency RCPs.

T.2

With one channel inoperable, the inoperable channel must be placed in the tripped condition within 6 hours. Placing the channel in the tripped condition results in a partial trip condition requiring only one additional channel to initiate a reactor trip above the P-7 setpoint ~~and below the P-8 setpoint~~. These Functions do not have to be OPERABLE below the P-7 setpoint because there are no loss of flow trips below the P-7 setpoint. The 6 hours allowed to place the channel in the tripped condition is justified in Reference 7. An additional 6 hours is allowed to reduce THERMAL POWER to below P-7 if the inoperable channel cannot be restored to OPERABLE status or placed in trip within the specified Completion Time.

Insert
B 3.3-45-01

Insert:
B 3.3-45-02

Allowance of this time interval takes into consideration the redundant capability provided by the remaining redundant

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-45-01:

for the two loop function and above the P-8 setpoint for the single loop function.

INSERT B 3.3-45-02:

The Reactor Coolant Flow-Low (Single Loop) reactor trip does not have to be OPERABLE below the P-8 setpoint; however, the Required Action must take the plant below the P-7 setpoint if the inoperable channel is not tripped within 6 hour because of the shared components between this function and the Reactor Coolant Flow-Low (Two Loop) reactor trip function.

BASES

ACTIONS

~~M~~ H.1 and ~~M~~ H.2 (continued)

OPERABLE channel, and the low probability of occurrence of an event during this period that may require the protection afforded by the Functions associated with Condition ~~M~~ H.

The Required Actions have been modified by a Note that allows placing the inoperable channel in the bypassed condition for up to ~~4~~ 8 hours while performing routine surveillance testing of the other channels. The ~~4~~ 8 hour time limit is justified in Reference 7.

T.2

~~N.1 and N.2~~

~~Condition N applies to the Reactor Coolant Flow—Low (Single Loop) reactor trip Function. With one channel inoperable, the inoperable channel must be placed in trip within 6 hours. If the channel cannot be restored to OPERABLE status or the channel placed in trip within the 6 hours, then THERMAL POWER must be reduced below the P-8 setpoint within the next 4 hours. This places the unit in a MODE where the LCO is no longer applicable. This trip Function does not have to be OPERABLE below the P-8 setpoint because other RTS trip Functions provide core protection below the P-8 setpoint. The 6 hours allowed to restore the channel to OPERABLE status or place in trip and the 4 additional hours allowed to reduce THERMAL POWER to below the P-8 setpoint are justified in Reference 7.~~

~~The Required Actions have been modified by a Note that allows placing the inoperable channel in the bypassed condition for up to 4 hours while performing routine surveillance testing of the other channels. The 4 hour time limit is justified in Reference 7.~~

~~O~~ I.1 and ~~O~~ I.2

Condition ~~O~~ I applies to the RCP Breaker Position (Single Loop) reactor trip Function. There is one breaker position device per RCP breaker. With one channel inoperable, the inoperable channel must be restored to OPERABLE status within 6 hours. If the channel cannot be restored to OPERABLE status within the 6 hours, then THERMAL POWER must be reduced below the P-8 setpoint within the next 4 hours.

(continued)

BASES

ACTIONS

~~O~~ Ⓘ.1 and ~~O~~ Ⓘ.2 (continued)

This places the unit in a MODE where the LCO is no longer applicable. This Function does not have to be OPERABLE below the P-8 setpoint because other RTS Functions provide core protection below the P-8 setpoint. The 6 hours allowed to restore the channel to OPERABLE status and the 4 additional hours allowed to reduce THERMAL POWER to below the P-8 setpoint are justified in Reference 7.
The Required Actions have been modified by a Note that allows placing the inoperable channel in the bypassed condition for up to ~~4~~ ⑧ hours while performing routine surveillance testing of the other channels. The ~~4~~ ⑧ hour time limit is justified in Reference 7.

~~P~~ Ⓙ.1 and ~~P~~ Ⓙ.2

Condition ~~P~~ Ⓙ applies to Turbine Trip on ~~Low Fluid~~ Auto Stop Oil Pressure ~~or on Turbine Stop Valve Closure~~. With one channel inoperable, the inoperable channel must be placed in the trip condition within 6 hours. If placed in the tripped condition, this results in a partial trip condition requiring only one additional channel to initiate a reactor trip. If the channel cannot be restored to OPERABLE status or placed in the trip condition, then power must be reduced ⑥ below the ~~P-9~~ P-8 setpoint within the next ④ hours. The 6 hours allowed to place the inoperable channel in the tripped condition and the ④ hours allowed for reducing power are justified in Reference ~~7~~ ⑩. R.1

The Required Actions have been modified by a Note that allows placing the inoperable channel in the bypassed condition for up to ~~4~~ ⑧ hours while performing routine surveillance testing of the other channels. The ~~4~~ 8 hour time limit is justified in Reference 7.

~~Q~~ Ⓚ.1 and ~~Q~~ Ⓚ.2

Condition ~~Q~~ Ⓚ applies to the SI Input from ESFAS reactor trip and the RTS Automatic Trip Logic in MODES 1 and 2. These actions address the train orientation of the RTS for these Functions. With one train inoperable, 6 hours are allowed to restore the train to OPERABLE status (Required Action ~~Q~~ Ⓚ.1) or the unit must be placed in MODE 3 within the

(continued)

BASES

ACTIONS

~~Q~~K.1 and ~~Q~~K.2 (continued)

next 6 hours. The Completion Time of 6 hours (Required Action ~~Q~~K.1) is reasonable considering that in this Condition, the remaining OPERABLE train is adequate to perform the safety function and given the low probability of an event during this interval. The Completion Time of 6 hours (Required Action ~~Q~~K.2) is reasonable, based on operating experience, to reach MODE 3 from full power in an orderly manner and without challenging unit systems.

The Required Actions have been modified by a Note that allows bypassing one train up to ~~(4)~~ 8 hours for surveillance testing, provided the other train is OPERABLE.

~~R~~L.1 and ~~R~~L.2

Condition ~~R~~L applies to the RTBs in MODES 1 and 2. These actions address the train orientation of the RTS for the RTBs. With one train inoperable, 1 hour is allowed to restore the train to OPERABLE status or the unit must be placed in MODE 3 within the next 6 hours. The Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 from full power in an orderly manner and without challenging unit systems. The 1 hour and 6 hour Completion Times are equal to the time allowed by LCO 3.0.3 for shutdown actions in the event of a complete loss of RTS Function. Placing the unit in MODE 3 ~~removes the requirement for this particular Function~~.

Insert: B 3.3-48-01

The Required Actions have been modified by two Notes. Note 1 allows one channel to be bypassed for up to 2 hours for surveillance testing, provided the other channel is OPERABLE. Note 2 allows one RTB to be bypassed for up to 2 hours for maintenance on undervoltage or shunt trip mechanisms if the other RTB train is OPERABLE. The 2 hour time limit is justified in Reference 7.

~~S~~M.1 and ~~S~~M.2

Condition ~~S~~M applies to the P-6 and P-10 interlocks. With one channel inoperable for one-out-of-two or two-out-of-four coincidence logic, the associated interlock must be verified to be in its required state for the existing unit condition

or more channels

(continued)

As noted in reference 7, the [illegible] test [illegible] trip [illegible] Condition L [illegible]

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-48-01:

results in ACTION C entry while RTB(s) are inoperable.

BASES

ACTIONS

Ⓜ ~~S~~.1 and Ⓜ ~~S~~.2 (continued)

within 1 hour or the unit must be placed in MODE 3 within the next 6 hours. Verifying the interlock status manually accomplishes the interlock's Function. The Completion Time of 1 hour is based on operating experience and the minimum amount of time allowed for manual operator actions. The Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 from full power in an orderly manner and without challenging unit systems. The 1 hour and 6 hour Completion Times are equal to the time allowed by LCO 3.0.3 for shutdown actions in the event of a complete loss of RTS Function.

Ⓝ ~~T~~.1 and Ⓝ ~~T~~.2

Condition ~~T~~ Ⓝ applies to the P-7, and P-8, ~~P-9,~~ ~~and P-13~~ interlocks and the turbine first stage input to P7. With one or more channel inoperable for one-out-of-two or two-out-of-four coincidence logic, the associated interlock must be verified to be in its required state for the existing unit condition within 1 hour or the unit must be placed in MODE 2 within the next 6 hours. These actions are conservative for the case where power level is being raised. Verifying the interlock status manually accomplishes the interlock's Function. The Completion Time of 1 hour is based on operating experience and the minimum amount of time allowed for manual operator actions. The Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 2 from full power in an orderly manner and without challenging unit systems.

Ⓞ ~~U~~.1, ~~U.2.1,~~ and U.2~~.2~~ Ⓞ

Condition ~~U~~ Ⓞ applies to the RTB Undervoltage and Shunt Trip Mechanisms, or diverse trip features, in MODES 1 and 2. With one of the diverse trip features inoperable, it must be restored to an OPERABLE status within 48 hours or the unit must be placed in a MODE where the requirement does not apply. This is accomplished by placing the unit in MODE 3 within the next 6 hours (54 hours total time) ~~followed by opening the RTBs in 1 additional hour (55 hours total time)~~. The Completion Time of 6 hours is a reasonable time, based on operating experience, to reach MODE 3 from full power in an orderly manner and without challenging unit systems.

(continued)

BASES

ACTIONS O U.1, ~~U.2.1,~~ and U.2.2 (continued)

With the ~~RTBs open and the~~ unit in MODE 3, ~~this trip Function is no longer required to be OPERABLE~~. The affected RTB shall not be bypassed while one of the diverse features is inoperable except for the time required to perform maintenance or testing to one of the diverse features. The allowable time for performing maintenance of the diverse features is 2 hours for the reasons stated under Condition ~~R~~ L. O

Insert: B 3.3-50-01

R.1

The Completion Time of 48 hours for Required Action U.1 is reasonable considering that in this Condition there is one remaining diverse feature for the affected RTB, and one OPERABLE RTB capable of performing the safety function and given the low probability of an event occurring during this interval.

~~V.1~~

~~With two RTS trains inoperable, no automatic capability is available to shut down the reactor, and immediate plant shutdown in accordance with LCO 3.0.3 is required.~~

SURVEILLANCE REQUIREMENTS The SRs for each RTS Function are identified by the SRs column of Table 3.3.1-1 for that Function.

A Note has been added to the SR Table stating that Table 3.3.1-1 determines which SRs apply to which RTS Functions.

Note that each channel of process protection supplies both ~~trains~~ train A and train B of the RTS. ~~When testing Channel I, Train A and Train B must be examined. Similarly, Train A and Train B must be examined when testing Channel II, Channel III, and Channel IV (if applicable).~~ Insert B 3.3-50-02 The CHANNEL CALIBRATION and COTs are performed in a manner that is consistent with the assumptions used in analytically calculating the required channel accuracies.

~~Reviewer's Note: Certain Frequencies are based on approval topical reports. In order for a licensee to use these times, the licensee must justify the Frequencies as required by the staff SER for the topical report.~~

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-50-01:

ACTION C applies to any inoperable RTB trip mechanism.

INSERT B 3.3-50-02:

When testing an individual channel, the SR is not met until both train A and train B logic are tested.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.1

Performance of the CHANNEL CHECK once every 12 hours ensures that gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels or of something ~~even~~ more serious. A CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying that the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the unit staff based on a combination of the channel instrument uncertainties, including indication and readability. If a channel is outside the criteria, it may be an indication that the sensor or the signal processing equipment has drifted outside its limit.

The Frequency is based on operating experience that demonstrates channel failure is rare. The CHANNEL CHECK supplements less formal~~, but more frequent,~~ checks of channels during normal operational use of the displays associated with the LCO required channels.

SR 3.3.1.2

SR 3.3.1.2 compares the calorimetric heat balance calculation to the NIS channel output every 24 hours. If the calorimetric exceeds the NIS channel output by > 2% RTP, the NIS is not declared inoperable, but must be adjusted. If the NIS channel output cannot be properly adjusted, the channel is declared inoperable.

Two Notes modify SR 3.3.1.2. The first Note indicates that the NIS channel output shall be adjusted consistent with the calorimetric results if the absolute difference between the NIS channel output and the calorimetric is > 2% RTP. The second Note clarifies that this Surveillance is required only if reactor power is ≥ 15% RTP and that 12 hour is
24 A

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.1.2 (continued)

allowed for performing the first Surveillance after reaching 15% RTP. At lower power levels, calorimetric data are inaccurate.

The Frequency of every 24 hours is adequate. It is based on unit operating experience, considering instrument reliability and operating history data for instrument drift. Together these factors demonstrate the change in the absolute difference between NIS and heat balance calculated powers rarely exceeds 2% in any 24 hour period.

In addition, control room operators periodically monitor redundant indications and alarms to detect deviations in channel outputs.

SR 3.3.1.3

SR 3.3.1.3 compares the incore system to the NIS channel output every 31 EFPD. If the absolute difference is ≥ 3%, the NIS channel is still OPERABLE, but must be readjusted.

If the NIS channel cannot be properly readjusted, the channel is declared inoperable. This Surveillance is performed to verify the f(ΔI) input to the overtemperature ΔT Function.

Insert B3.3-52-01

Two Notes modify SR 3.3.1.3. Note 1 indicates that the excore NIS channel shall be adjusted if the absolute difference between the incore and excore AFD is ≥ 3%. Note 2 clarifies that the Surveillance is required only if reactor power is ≥ ~~[15%] RTP and that 24 hours is allowed for performing the first Surveillance after reaching [15%] RTP.~~

Insert B3.3-52-02

CLB:

The Frequency of every 31 EFPD is adequate. It is based on unit operating experience, considering instrument reliability and operating history data for instrument drift. Also, the slow changes in neutron flux during the fuel cycle can be detected during this interval.

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-52-01:

SR 3.3.1.3 is performed to ensure that the AFD input to the Overtemperature Delta T and the system used to monitor LCO 3.2.3, AFD, are within acceptable limits. The limiting AFD is established to provide the required margin when operating at the highest power level. As power level decreases, the thermal limit becomes less sensitive to AFD because the overall margin to the thermal limit increases.

R·1
RAI
3.3.1-8
(02)

INSERT B 3.3-52-02:

≥ 90% because the requirements of LCO 3.2.3, Axial Flux Difference (AFD), are relaxed significantly below 90% RTP.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.4

SR 3.3.1.4 is the performance of a TADOT every 31 days on a STAGGERED TEST BASIS. This test shall verify OPERABILITY by actuation of the end devices.

of the undervoltage and shunt trip function

The RTB test shall include separate verification of the undervoltage and shunt trip mechanisms. Independent verification of RTB undervoltage and shunt trip Function is not required for the bypass breakers. No capability is provided for performing such a test at power. The independent test for bypass breakers is included in SR 3.3.1.14. The bypass breaker test shall include a local shunt trip. A Note has been added to indicate that this test must be performed on the bypass breaker prior to placing it in service.

The Frequency of every 31 days on a STAGGERED TEST BASIS is adequate. It is based on industry operating experience, considering instrument reliability and operating history data.

SR 3.3.1.5

RPS relay logic

required by Table 3.3.1-1

SR 3.3.1.5 is the performance of an ACTUATION LOGIC TEST. The SSPS is tested every 31 days on a STAGGERED TEST BASIS ⊙ ~~using the semiautomatic tester~~. The train being tested is placed in the bypass condition, thus preventing inadvertent actuation. ~~Through the semiautomatic tester,~~ All possible logic combinations, with and without applicable permissives, are tested for each protection function. The Frequency of every 31 days on a STAGGERED TEST BASIS is adequate. It is based on industry operating experience, considering instrument reliability and operating history data.

SR 3.3.1.6

SR 3.3.1.6 is a calibration of the excore channels to the incore channels. If the measurements do not agree, the excore channels are not declared inoperable but must be calibrated to agree with the incore detector measurements. If the excore channels cannot be adjusted, the channels are declared inoperable. This Surveillance is performed to verify the f(ΔI) input to the overtemperature ΔT Function.

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.3.1.6 (continued)

A Note modifies SR 3.3.1.6. The Note states that this Surveillance is required only if reactor power is > ~~50% RTP and that [24] hours is allowed for performing the first surveillance after reaching 50% RTP~~.

Insert B 3.3-54-01

The Frequency of ~~92~~ 31 EFPD is adequate~~. It is~~ based on industry operating experience, considering instrument reliability and operating history data for instrument drift. |R.1

SR 3.3.1.7

SR 3.3.1.7 is the performance of a COT every [92] days.

A COT is performed on each required channel to ensure the entire channel will perform the intended Function.

Setpoints must be within the Allowable Values specified in Table 3.3.1-1.

The difference between the current "as found" values and the previous test "as left" values must be consistent with the drift allowance used in the setpoint methodology. The setpoint shall be left set consistent with the assumptions of ~~the current unit specific setpoint methodology~~ Reference 6 which incorporates the requirements of Reference 7.

The "as found" and "as left" values must also be recorded and reviewed. ~~for consistency with the assumptions of Reference 7~~.

SR 3.3.1.7 is modified by a Note that provides a 4 hour delay in the requirement to perform this Surveillance for source range instrumentation when entering MODE 3 from MODE 2. This Note allows a normal shutdown to proceed without a delay for testing in MODE 2 and for ~~a short time~~ 4 hours in MODE 3 until the RTBs are open and SR 3.3.1.7 is no longer required to be performed. If the unit is to be in MODE 3 with the RTBs closed for > 4 hours this Surveillance must be performed prior to 4 hours after entry into MODE 3. |R.1

The Frequency of [92] days is justified in Reference 7.

Insert: B 3.3-54-02

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-54-01:

90% because the requirements of LCO 3.2.3, Axial Flux Difference (AFD), are relaxed significantly below 90% RTP. SR 3.3.1.6 is performed to ensure that the AFD input to the Overtemperature Delta T and the system used to monitor LCO 3.2.3, AFD, are within acceptable limits. The limiting AFD is established to provide the required margin when operating at the highest power level. As power level decreases, the thermal limit becomes less sensitive to AFD because the overall margin to the thermal limit increases.

INSERT B 3.3-54-02:

The 4 hour deferral is needed because the testing required by SR 3.3.1.7 and SR 3.3.1.8 can not be performed on the Source Range, Intermediate Range, and Power Range instruments until in the Applicable Mode and the proximity of these instruments prevents working on more than one instrument at any one time.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.8

SR 3.3.1.8 is the performance of a COT as described in SR 3.3.1.7, except it is modified by a Note that this test shall include verification that the P-6 and P-10 interlocks are in their required state for the existing unit condition. The Frequency is modified by a Note that allows this surveillance to be satisfied if it has been performed within [92] days of the Frequencies prior to reactor startup and four hours after reducing power below P-10 and P-6. The Frequency of "prior to startup" ensures this surveillance is performed prior to critical operations and applies to the source, intermediate and power range low instrument channels. The Frequency of "4 hours after reducing power below P-10" (applicable to intermediate and power range low channels) and "4 hours after reducing power below P-6" (applicable to source range channels) allows a normal shutdown to be completed and the unit removed from the MODE of Applicability for this surveillance without a delay to perform the testing required by this surveillance. The Frequency of every 92 days thereafter applies if the plant remains in the MODE of Applicability after the initial performances of prior to reactor startup and four hours after reducing power below P-10 or P-6. The MODE of Applicability for this surveillance is < P-10 for the power range low and intermediate range channels and < P-6 for the source range channels. Once the unit is in MODE 3, this surveillance is no longer required. If power is to be maintained < P-10 or < P-6 for more than 4 hours, then the testing required by this surveillance must be performed prior to the expiration of the 4 hour limit. ~~Four hours is~~ a reasonable time to complete the required testing or place the unit in a MODE where this surveillance is no longer required. This test ensures that the NIS source, intermediate, and power range low channels are OPERABLE prior to taking the reactor critical and after reducing power into the applicable MODE (< P-10 or < P-6) for periods > 4 hours.

12 hours after reducing power below P-10 and 4 hours after reducing power below P-6.

R.1

R.1 T.3

12

R.1

Insert: B 3.3-55-01

T.3

for more than 12 hours

R.1

time

The specified Frequency provides

within a reasonable time

Insert: B 3.3-55-02

SR 3.3.1.9

SR 3.3.1.9 is the performance of a TADOT and is performed every [92] days, as justified in Reference 7.

(continued)

INSERT B 3.3-55-01:

T.3

Additionally, this SR must be completed for the intermediate and power range low channels within 12 hours after reducing power below the P-10 setpoint and must be completed for the source range low channel within 4 hours after reducing power below the P-6 setpoint.

INSERT B 3.3-55-02:

T.3

The deferral of the requirement to perform this test until 12 and 4 hours after entering the Applicable condition is needed because the testing required by SR 3.3.1.7 and SR 3.3.1.8 cannot be performed on the Source Range, Intermediate Range, and Power Range instruments until in the Applicable Mode and the proximity of these instruments prevents working on more than one instrument at any one time.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.1.9 (continued)

The SR is modified by a Note that excludes verification of setpoints from the TADOT. Since this SR applies to RCP undervoltage and underfrequency relays, setpoint verification requires elaborate bench calibration and is accomplished during the CHANNEL CALIBRATION.

SR 3.3.1.10

Insert B3.3-56-01

A CHANNEL CALIBRATION is performed every [18] months, or ~~approximately~~ at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy.

used in Reference 6

CHANNEL CALIBRATIONS must be performed consistent with the assumptions ~~of the unit specific setpoint methodology~~. The difference between the current "as found" values and the previous test "as left" values must be consistent with the drift allowance used in the setpoint methodology.

used for

The Frequency ~~of 18 months~~ is based on the ~~assumption of an 18 month~~ calibration interval in the determination of the magnitude of equipment drift in the setpoint methodology.

SR 3.3.1.10 is modified by a Note stating that this test shall include verification that the time constants are adjusted to the prescribed values where applicable.

SR 3.3.1.11

This is needed because the

24

SR 3.3.1.11 is the performance of a CHANNEL CALIBRATION, as described in SR 3.3.1.10, every (18) months. This SR is modified by a Note stating that neutron detectors are excluded from the CHANNEL CALIBRATION. The CHANNEL CALIBRATION for the power range neutron detectors consists of a normalization of the detectors based on a power calorimetric and flux map performed above 15% RTP. The CHANNEL CALIBRATION for the source range and intermediate range neutron detectors consists of obtaining the detector

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-56-01:

At every refueling and every 18 months for Function 11.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.1.11 (continued)

91

plateau or preamp discriminator curves, evaluating those curves, and comparing the curves to the manufacturer's data. This Surveillance is not required for the NIS power range detectors for entry into MODE 2 or 1, and is not required for the NIS intermediate range detectors for entry into MODE 2, because the unit must be in at least MODE 2 to perform the test for the intermediate range detectors and MODE 1 for the power range detectors. The [18] month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed on the [18] month Frequency.

24

SR 3.3.1.12

24

SR 3.3.1.12 is the performance of a CHANNEL CALIBRATION, as described in SR 3.3.1.10, every [18] months. This SR is modified by a Note stating that this test shall include verification of ~~the RCS resistance temperature detector (RTD) bypass loop flow rate.~~

~~This test will verify~~ the rate lag compensation for flow from the core to the RTDs.

Insert B3.3-57-01

a 24

The Frequency is justified by the assumption of ~~an 18~~ month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

SR 3.3.1.13

SR 3.3.1.13 is the performance of a COT of RTS interlocks every [18] months.

24

The Frequency is based on the known reliability of the interlocks and the multichannel redundancy available, and has been shown to be acceptable through operating experience.

(continued)

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-57-01:

Whenever a sensing element is replaced, the next required CHANNEL CALIBRATION of resistance temperature detectors (RTD) sensors, which may consist of an inplace qualitative assessment of sensor behavior and normal calibration of the remaining adjustable devices in the channel, is accomplished by an inplace cross calibration that compares the other sensing elements with the recently installed element.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.14

SR 3.3.1.14 is the performance of a TADOT of the Manual Reactor Trip, RCP Breaker Position, and the SI Input from ESFAS. This TADOT is performed every ~~[18]~~ 24 months. The test shall independently verify the OPERABILITY of the undervoltage and shunt trip mechanisms for the Manual Reactor Trip Function for the Reactor Trip Breakers and Reactor Trip Bypass Breakers. The Reactor Trip Bypass Breaker test shall include testing of the automatic undervoltage trip.

R 1
RAI 3.3.1-17
(C1)

The Frequency is based on the known reliability of the Functions and the multichannel redundancy available, and has been shown to be acceptable through operating experience.

The SR is modified by a Note that excludes verification of setpoints from the TADOT. The Functions affected have no setpoints associated with them.

SR 3.3.1.15

SR 3.3.1.15 is the performance every 24 months of a TADOT of Turbine Trip Functions. This TADOT is as described in SR 3.3.1.4~~, except that this test is performed prior to reactor startup. A Note states that this Surveillance is not required if it has been performed within the previous 31 days. Verification of the Trip Setpoint does not have to be performed for this Surveillance~~. Performance of this test will ensure that the turbine trip Function is OPERABLE prior to taking the reactor critical. This test cannot be performed with the reactor at power ~~and must therefore be performed prior to reactor startup~~.

~~SR 3.3.1.16~~

~~SR 3.3.1.16 verifies that the individual channel/train actuation response times are less than or equal to the maximum values assumed in the accident analysis. Response time testing acceptance criteria are included in Technical Requirements Manual, Section 15 (Ref. 8). Individual component response times are not modeled in the analyses.~~

(continued)

BASES

SURVEILLANCE REQUIREMENTS

~~SR 3.3.1.16 (continued)~~

~~The analyses model the overall or total elapsed time, from the point at which the parameter exceeds the trip setpoint value at the sensor to the point at which the equipment reaches the required functional state (i.e., control and shutdown rods fully inserted in the reactor core).~~

~~For channels that include dynamic transfer Functions (e.g., lag, lead/lag, rate/lag, etc.), the response time test may be performed with the transfer Function set to one, with the resulting measured response time compared to the appropriate FSAR response time. Alternately, the response time test can be performed with the time constants set to their nominal value, provided the required response time is analytically calculated assuming the time constants are set at their nominal values. The response time may be measured by a series of overlapping tests such that the entire response time is measured.~~

~~As appropriate, each channel's response must be verified every [18] months on a STAGGERED TEST BASIS. Testing of the final actuation devices is included in the testing. Response times cannot be determined during unit operation because equipment operation is required to measure response times. Experience has shown that these components usually pass this surveillance when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.~~

~~SR 3.3.1.16 is modified by a Note stating that neutron detectors are excluded from RTS RESPONSE TIME testing. This Note is necessary because of the difficulty in generating an appropriate detector input signal. Excluding the detectors is acceptable because the principles of detector operation ensure a virtually instantaneous response.~~

REFERENCES

1. FSAR, Chapter ~~[~~7~~]~~.
2. FSAR, Chapter ~~[~~6~~]~~.
3. FSAR, Chapter ~~[15]~~. 14
4. IEEE-279-~~1971~~. 1968

(continued)

BASES

REFERENCES (continued)

5. 10 CFR 50.49.

Insert
B 3.3-60-01

6. ~~RTS/ESFAS Setpoint Methodology Study~~.

7. WCAP-10271-P-A, Supplement 2, Rev. 1, June 1990.

~~8. Technical Requirements Manual, Section 15, "Response Times."~~

Insert.
B 3.3-60-02

NUREG-1431 Markup Inserts
ITS SECTION 3.3.1 - REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION

INSERT B 3.3-60-01:

6. Engineering Standards Manual IES-3B and IES-3, Instrument Loop Accuracy and Setpoint Calculation Methodology (IP3).

INSERT B 3.3-60-02:

8. Consolidated Edison Company of New York, Inc. Indian Point Nuclear Generating Station Unit No. 3 Plant Manual Volume VI: Precautions, Limitations, and Setpoints, March 1975.

9. WCAP14384, Implementation of RPS Technical Specification Relaxation Programs, Rev. 0, January 1996.

Indian Point 3
Improved Technical Specifications (ITS)
Conversion Package

Technical Specification 3.3.1:
"Reactor Protection System (RPS) Instrumentation"

PART 6:

Justification of Differences between

NUREG-1431 and IP3 ITS

JUSTIFICATION OF DIFFERENCES FROM NUREG-1431
ITS SECTION 3.3.1 - REACTOR TRIP SYSTEM (RTS) INSTRUMENTATION

RETENTION OF EXISTING REQUIREMENT (CURRENT LICENSING BASIS)

CLB.1 NUREG-1431, Rev 1, Section 3.3.6, was modified as needed to reflect the IP3 design and current licensing basis. A detailed description of the design, accident analysis assumptions, and Operability requirements are incorporated into the IP3 ITS Bases. These changes maintain the IP3 current licensing basis except as identified and justified in the CTS/ITS discussion of changes.

CLB.2 NUREG-1431, Rev 1, Bases discussion for Note 2 of SR 3.3.1.3 clarifies that a period of 24 hours is allowed to perform the surveillance after reaching the specified power level. The ITS Bases discussion is modified to reflect CTS 3.11.B which requires that the surveillance be performed before the specified power level is reached. The revised wording maintains the IP3 current licensing basis and provides a clearer explanation of the intent of the requirement. At power levels below the specified limit, the surveillance does not need to be performed because the overall margin to fuel thermal limits is increased.

PLANT-SPECIFIC WORDING PREFERENCE OR MINOR EDITORIAL IMPROVEMENT

PA.1 Corrected typographical error or made a minor editorial improvement to improve clarity and ensure requirements are fully understood and consistently applied. There are no technical changes to requirements as specified in NUREG 1431, Rev. 1; therefore, this change is not a significant or generic deviation from NUREG 1431, Rev 1.

PLANT-SPECIFIC DIFFERENCE IN THE DESIGN OR DESIGN BASIS

DB.1 Design or implementation details are incorporated or revised as necessary to more precisely describe IP3 current design or practice. These changes are intended to describe the design, improve clarity, or ensure requirements are fully understood and consistently applied. Unless identified and described blow, these changes are self-explanatory. A detailed description of the design, accident analysis assumptions, and Operability requirements are incorporated into the IP3 ITS Bases. These changes maintain the IP3 current licensing basis except as identified and justified in the CTS/ITS discussion of changes.

DIFFERENCE BASED ON A GENERIC CHANGE TRAVELER FOR NUREG-1431

T.1 This change incorporates Revision 2 of Generic Change TSTF-135 (WOG-58) which incorporates several corrections and clarifications to Required Actions for this Limiting condition for Operation.

T.2 This change incorporates Generic Change TSTF-169 (WOG-80) which combines 3.3.1, Function 10.a, Reactor Coolant Flow-Low (trip) (One Loop) and 3.3.1, Function 10.b, Reactor Coolant Flow-Low (trip) (two loop) and deletes the Required Action N.1 for LCO 3.3.1, Function 10.a. This change is needed because Action N.1 requires the channel to be tripped within 6 hours or power reduced below P-8 within 10 hours if a Reactor Coolant Flow channel is inoperable above P-8. If the channel can not be tripped, the Applicability of the two-loop trip function is entered (below P-8) and Action M.1 again requires the channel to be tripped within 6 hours or power reduced below P-7 (per M.2) in 12 hours. Since the transmitter and other loop constituents are common to both trip functions, sequential entry into N then M would allow a 22 hour AOT when only a 12 hour AOT for maintenance was evaluated in WCAP-10271 and its supplements. A 22 hour allowance is also inconsistent with the TOPS Guidelines, WOG-90-18, dated 11/1/90. This generic change to NUREG-1431, Rev 1, is approved by the NRC.

T.3 This change incorporates Generic Change TSTF-242 (WOG-106) which extends the time for performing a COT on power range and intermediate range instrumentation to 12 hours after reducing power below P-10. This change is needed because it ensures that sufficient time is allotted to perform a proper COT. A review of industry work history revealed that COTs on the power range and intermediate range instrumentation requires 1 - 2 hours per channel. This is consistent with the source range COT time allowance in SR 3.3.1.8, as 4 hours is given for a 2 channel system. The power range and intermediate range COTs consist of 6 channels and 4 hours isn't sufficient to perform these COTs in a quality manner. Therefore, the time to perform these COTs is extended to 12 hours (2 hours per channel) to be consistent with the source range time allowance of 4 hours for 2 channels. This generic change to NUREG-1431, Rev 1, is approved by the NRC.

DIFFERENCE FOR ANY REASON OTHER THAN ABOVE

None